Improving Usability Outcomes in IS Projects: the Views of Usability Practitioners

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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; and, there has been no editorial work, paid or unpaid, carried out by a third party on this thesis.

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Abstract

What are the key aspects to achieving acceptable usability outcomes for information systems being developed? The changing technologies and increased usage across the general population, the impacts of this in our everyday lives, at work and at leisure are exponentially increasing. The interfaces and interaction styles presented as part of these technologies have been challenged to be more intuitive, contextually sensitive, location aware, human centred and aimed at a larger community of stakeholders. Performing usability activities is an increasingly important part of the development of new technologies, applications and websites. This study examined, for Information System projects, what were the key aspects that impacted on the usability outcome of developing Information Systems.

This study presents a theory that describes how projects can improve their usability outcomes. This has emerged from interviews with experienced usability practitioners currently working in the usability industry. The transcripts from the qualitative interviews were analysed using a grounded theory methodology, which was an inductive and interpretive process in nature. The result of this analysis produced twenty-seven key concepts. These concepts were compared and contrasted against the literature.

The theory that emerged consists of four major themes that included: usability mindset, collaborative approach, project constraints and usability practice. The key contribution to knowledge is the relationship concept between these themes. This is the nurturing of the usability mindset for the project stakeholders through involvement in usability activities throughout the project lifecycle. This engagement provides opportunities to elicit, understand and concord the usability goals, project constraints and the technological limitations with project stakeholders. The involvement of all project stakeholders promotes usability value and acceptance, which ideally progresses to a shared usability vision for the project and ultimately a usability mindset that can be utilised beyond a specific project and across an organisation.

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CHAPTER 1

1. Introduction

In this thesis the concept of usability and usability activities have been explored in practice, through the eyes of usability practitioners. The stories told by these practitioners have provided a set of key concepts that impact on the usability outcome for a project. Many of these concepts have been highlighted before in the literature, but what this research shows, based on the rich and deep data elicited and analysed, is that the relationships between these concepts provides a greater understanding of what has a significant impact on usability outcomes.

Usability practitioners strive, in the performance of usability activities, to attain a beneficial usability outcome for a given IS project (Anderson, J et al. 2001; Boivie, Gulliksen & Göransson 2006; Folmer & Bosch 2005; Gulliksen, Boivie & Göransson 2006; Smith et al. 2007; Uldall-Espersen & Frøkjær 2007). Many projects are successfully planned, developed and implemented, but are not usable, with minimal or no usability activities being performed throughout a project lifecycle(Agarwala & Rathod 2006; Jones 2004; Reel 1999; Sherman 2006). Some projects may have limited usability performed, usually towards the end of a project, which result in varying usability outcomes. Usability should not be an add-on, even though it often is, that can be taken in parts as an optional extra; it needs to be an integral part of a project lifecycle. The project team culture, the users' cultureand, ultimately, the organisational culture play an important role in the success of usability and lead to a usable outcome for an IS project.

Where do the energies of a usability practitioner, especially a novice usability practitioner, need to be directed to maximise a beneficial usability outcome and steer clear of detrimental usability outcomes? This research seeks to inform industry, academia and educational institutions of what are the important aspects to consider for an IS project to improve usability outcomes. Research often focuses on developing new usability activities, as discussed by Seland (2006), or improving current usability activities, as described by Sears (1997), in an attempt to improve

usability outcomes. Other research looks to improving the articulation of usability findings(Bernhaupt & Weiss 2007), while other research looks to involvement as a key(Barki & Jon 1994; Kujala 2003).

This chapter will outline this research project by firstly examining the motivation behind performing this research. Secondly, it discusses what is usability and what is the role of usability practitioners. Thirdly, the research question being answered by this research is presented, along with the scope of the study. Finally, an outline of the thesis has been presented.

1.1. Motivation of the Research

There are many aspects that have motivated this research, these include:

- Usability is difficult but important to an IS project. The value placed on usability is important and gaining credibility throughout the IT Industry, especially with IT practitioners and key organisational stakeholders. ‘Great advantage occurs when the actual human value of an artefact becomes the core criteria on which usability inquiries are grounded’(Carter 2007). The success and failure of IS projects is often attributed to stakeholders issues (Jones 2004; Kappelman, McKeeman & Zhang 2007; Karlsen et al. 2006; Linberg 1999; Reel 1999; Standing et al. 2006), such as user resistance, lack of senior management support, lack of involvement. Performance of usability activities is being valued as providing potential competitive advantage and cost benefits to an organisation’s bottom line. So, practitioners’ focus on improving stakeholder understanding of the value of usability provides possible improvement in usability outcomes for IS projects.
- New devices, such as smart phones and tablets (like the iPad (Apple.com 2011b)), are requiring different considerations from a usability perspective, therefore what is usability for a given device changes. Information systems (IS) are being developed across a range of devices (Shneiderman 1998) with varying type of inputs and outputs, to perform tasks for many sets of users in specific contexts and/or environments. No longer doIS reside solely on the desktop computing domain. Web applications(Cloyd 2001; Finkelstein et al. 2002; Offutt 2002; Ziemer & Stalhane 2004), mobile applications (Beck et al. 2003; Kärkkäinen & Laarni 2002; Kjeldskov et al. 2005; Sherman 2006), and voice

recognition(Shneiderman 1998) are examples of the changing environments, both technically and physically, that are having significant impact on the usability outcome.

- There are a number of reasons why usability is gaining in importance and prominence in IS projects across business, government and communityinformation systems, especially web applications. Firstly, everyone now experiences usability through many everyday devices. It's no longer limited to professionals, inventors and researchers (Shneiderman 1998). Secondly, usability of web applications is experiencedfirst(Nielsen 2000), before users commit to purchase, for such things as organisation e-support and e-commerce functions. Thirdly, quality attributes, specified in ISO standards, dictate usability as a key consideration in any project (AS/NZS_4216 1994; ISO/DIS_9241-11.2 1997). Fourthly, governments lawmakers require compliance to statutory laws, like the American Rehabilitation Act (section508.gov 1998) and the Australian Discrimination Act 1992 (austlii.edu.au 1992). Finally, usability can save on development, training and support costs (Rajanen & Iivari 2007). There are now many reasons for organisations and project teams to consider performing usability activities throughout a project lifecycle.
- The lack of usability understanding, the misuse of usability activities and lack of understanding or credibility of usability findings shows low usability maturity in practice. Dicks (2002) describe how usability is being misused in a number of ways. Firstly, usability is often misconstrued to mean the performance of empirical testing (or usability testing)(Rubin, J 1994). Secondly, usability research findings that evaluate usability activitiesbased on small populations and limited data, where valid conclusions cannot be drawn (Gray & Salzman 1998a, 1998b). Thirdly, the use of usability tests for verification of project requirements rather than integrating usability findings into other project activities. Usability activities often can be used in place of user acceptance testing, when it's too late for usability findings to impact on the project. Fourthly, the lack of understanding of the limitations in performing usability testing hinders the validity and reliability of the usability findings. Lastly, within an IS project it is important to articulate and consider the various usability attributes that define usability for the IS. The research does not provide good support for usability activities to allow improved usability outcomes. This thesis looks to provide understanding of what improves usability outcomes to help focus usability research.

Those setting up a project team or involved in an IS project need to understand the benefits of employing a full-time experienced usability practitioner, to perform usability activities. Many

project teams have either the project manager, business analyst or developers take on responsibilities for usability, but ‘usability issues require a “specialist” role’(Boivie, Gulliksen & Göransson 2006). For usability to be taken seriously within a project, there needs to be a specialist role for a usability practitioner that coordinates usability across the project lifecycle. Usability practitioners who take on broader roles will have opportunities to ‘Perform more early research, especially contextual field research, and then define user requirements for design’, ‘Create prototypes that enable rapid collection of more relevant and more accurate user data during evaluation’ and ‘Join integrated product teams that help the software design process become truly iterative and user-centered’(Rosenbaum 2008). Many research workshops (Buie et al. 2010; Czerwinski et al. 1996) look to education of usability practitioners based on industry needs and industry practice to improve their effectiveness in projects. Usability degrees(Arnowitz & Dykstra-Erickson 2005) and individual subjects are not commonly found in all universities, even though attempts are being made to change this in universities (Crouch & McKenzie 2006; Hammond 1996). This thesis looks to improve the practice of usability practitioners.

The exponential growth of computing technology (Kurzweil 2006)iscausing continual change of the interface design and interaction styles being used. Shneiderman (1998) describes generations in hardware and software, but the most interesting discussion is the change in interface design and interaction styles and how the primary users have moved from inventors only to “everyone”. Devices, such as the iPad (Apple.com 2011b), have introduced multi-touch screen interaction style for everyone to use, which presents a different interface paradigm and gesture control interaction style. Initial usability studies (Nielsen 2010) have shown serious usability issues with the iPad, showing a low level of usability maturity still exists in industry. ‘The practice of usability is maturing at different speeds in different organizations’(Rosenbaum 2008). The current growing trend is an increased focus on the user experience and usability practitioners who look beyond usability to user experience (Beauregard & Corriveau 2007; Jordan 2003; Kaye et al. 2007).

The need for usability practitioners and the need for the performance usability activities in projects is increasing. Chauhan (2006) reveals the increases in demand in both India and China, for usability practitioners. The emergence of this new discipline both in industry and research is growing. Some call it usability engineering (Butler 1996), HCI, human factor, usability, user experience. Based on the literature (Arnowitz 2007; Chauhan 2006) this need and value for usability practitioners in commercial, community and government organisations is growing. In

order for usability practitioners to survive and become more viable in the next 25 years (Arnowitz 2007), they need to have the best practice tools to practice usability, professional standards and professional credentials, must focus on using qualified usability practitioners in projects and acknowledge and reward experience practitioners.

The outcome of this research can help industry/organisations understand key elements that, from an organisational perspective, can increase the usability outcome in projects. It can help bridge the gap between the usability literature and industry practice of usability (Arnowitz 2007; Parush 2006; Sherman & Quesenbery 2005; Shum et al. 1994; Wixon 2003). Educational institutions will be empowered with the key elements that need to be infused into a teaching and learning curriculum.Usability practitioners can also gain understanding of the various facets of their job that are more important and need greater focus to improve usability outcomes.

1.2. What is usability?

Usability has been defined in various ways in the literature (Bruno & Al-Qaimari 2004; Krug 2000; Nielsen 1993; Shackel 1981; Shneiderman 1998). At a conceptual level usability is a desirable quality attribute (AS/NZS_4216 1994; Bevan, Nigel 1995; ISO/DIS_9241-11.2 1997). At a concrete level, usability is the set of usability attributes (or goals) that defines what is important for the interaction between the range of users performing a set of tasks on an IS in a given environment (see usability definition discussion in Section 2.2.1). The definition used by this research is:

> *Usability is the set of usability attributes that describes the interaction of, in human functional terms, the specified range of users, given specified training and support, to fulfil a specified range of tasks, within the specified range of environmental scenarios and organisational contexts for a specific usability situation.*

The maturity of the usability industry is still very low. When the industry debates its professional objectives, techniques and terminology it does not have these clearly defined(Marcus 2003). Usabilityis still looking to find its place in a project lifecycle within an IS project team and across an organisational structure.*Usability maturity* describes the level at which an organisation embraces the concept of usability, which has been the subject of research studies seeking to model these levels (Earthy, J. 1998, 1999; Jokela et al. 2006). For an organisation it is becoming

a focus for improvement (Jokela et al. 2006), which predominantly looks to usability processes and quality usability attributes.

There are many *usability activities* that can be performed throughout a project lifecycle on anIS. Usability activities can be integrated/included during project conceptualisation, research and analysis, design and evaluation, implementation and maintenance phases. The usability evaluation activities can be simple inspections that use heuristics (Muller & Carey 2002; Nielsen 1993), guidelines, standards, golden rules (Shneiderman 1998), principles (Cronholm & Goldkuhl 2005), etc. These usability evaluation activities can also be formal usability tests (Rubin, J 1994) that simulate environments, using prototypes and involving real users performing real tasks. While the performance of these activities can enhance usability outcomes, no one activity guarantees usability success, but rather supports the usability practitioner in highlighting usability issues.

Many usability activities require guidance, through the articulation of *usability goals* for an Information System (IS). This set of usability goals is specified in the usability requirements for a project. They help define what usability is for a given range of users, tasks, context and/or environment for an IS. The usability goals need to be articulated early in the development lifecycle. Each usability goal may have a different level of importance to the IS. A priority or balance needs to be struck between the usability goals. Some attributes may conflict with otherattributes which may require a concordance to be reached. Concordance is often required when a complex phenomenon with many elements may include definitions, set of usability goals, user goals and organisation goals.

The *usability outcome* of an IS project is highly dependent on the usability goals, used in the performance of usability activities, that have been articulated for a given IS project and the measurement of these goals can dictate a productive or detrimental usability outcome.*Usability processes*look to provide a structure in the performance of usability activities, that include providing the appropriate inputs, i.e. usability goals for a given IS project, the appropriate resources and stakeholder involvement required and the appropriate articulation and response to the results. An example of a comprehensive usability process is discussed in the actability literature (Cronholm & Goldkuhl 2005).

Usability is more than a definition, more than a set of usability goals specified in a usability requirement document to be adhered to, more than the performance of a set of usability activities specified in a project lifecycle, more than inter relationships between various elements of a

project, and more than an endgame activity to provide a usability stamp of approval for a developed IS. This research aims to examine what usability really encompasses in practice in order to help define what is important and what improves usability outcomes for a project.

1.3. Who are Usability Practitioners and what do they do?

A usability practitioner can often be described as one who performs usability activities within an IS project, and interprets the usability findings to be considered in the IS project. When examining the role of usability practitioners, many variations can be encountered in both industry practice and the literature. The various roles of usability practitioners can include:

- Usability mentor - someone who works closely with a member of the project team (e.g. business analyst) or designated usability champion for the organisation or specific project. They provide (one on one) the knowledge and understanding required to perform usability activities and focus on usability throughout the life of a project.
- Usability manager - manages a team of usability practitioners and distributes/allocates usability resources to projects.
- Usability Evangelist or Usability Salesperson - is a practitioner who looks to nurture usability understanding with project teams and/or organisational managers.
- Graphic designer, designer, information architect, or content specialist are specialist roles that predominantly focus on performing usability activities during the design phase of a project lifecycle.
- Usability tester/evaluator specialises in performing one of the many evaluation activities to evaluate the design of an IS.
- Usability analyst mostly analyses the context of a system, its range of users and required set of tasks and is then able to articulate the usability goals and usability requirements for the project.
- A usability practitioner, usability specialist or usability engineer is considered the ‘jack of all trades’ in relation to performing usability activities throughout a project lifecycle. They often will assume this title, but predominantly perform one of the roles discussed above or a combination.

The role of a usability practitioner is sometimes referred to as a designer, based on Muller and Carey's(2002) ethnographic study. This role can include visual design, usability engineering and interaction design. It is interesting that the practitioners working within the usability area are branded with a variety of titles or specialist roles. Robertson and Hewitt(Robertson, T 2004; Robertson, T & Hewlett 2004; Robertson, TJ et al. 2003) examined the role of Information Architects in which the authors discussed and relationships that closely relate to the generic role of a usability practitioner discussed in this research, this research is enfolded into this thesis in Chapter 6.

A usability practitioner can specialise in the usability activities performed and therefore can be engaged at specific points in a project lifecycle to perform them. The usability specialist is usually a consultant who is engaged when specialist skills are required within project, but organisational-based usability practitioners may also specialise based on the usability maturity of the organisation. In this research the professionals who perform usability activities within a project lifecycle, regardless of their specialisation, have been referred to as a usability practitioner.

1.4. Research Aim

The aim of this research was to elicit from industry-based usability practitioners, the aspects of their job that may lead to a beneficial or detrimental usability outcome. This can support the industry practice for usability practitioners with results that can direct practice to achieve a beneficial usability outcome for a project and its stakeholders. The results can also guide educational institutions' curriculum development and guide organisational culture change. It can provide the research sector a basis to compare and contrast with other usability research.

The primary research question for this research therefore was:

> ***What issues impact the usability outcome of a project, as perceived by usability practitioners?***

The sub-questions include:

> ***What should be the role of usability practitioners in a project?***
>
> ***How should project stakeholders engage with usability in a project?***

This question and other sub-questions have been answered, based on a theory that has emerged from the data collected from experienced usability practitioners.

1.5. Research methodology

The research methodology used by this study is described in Chapter 3. This plan consisted of a literature review that provided this researcher a general understanding of the context of usability practice. Then, twenty-one usability practitioners in industry, with five or more years of experience, were engaged in qualitative interviews using open-ended questions (discussed in Section 3.8). The transcripts of these interviews were analysed using an inductive and interpretivist qualitative approach (Eisenhardt 1989), which is a grounded theory methodology (Strauss & Corbin 1998), aided by a computer software tool, NVivo (QSRInternational 2011).

The resulting set of coded references produced an initial set of approximately one hundred and eighty concepts that were analysed (transcripts and memos) and grouped. The final broad grouping resulted in twenty-seven concepts. These concepts were then grouped, based on concept memos, into four emerging themes. These themes (made up of a group of concepts) along with the relationships between them make up the theory used to answer the research question. This theory enabled the answers of the main research question and the subsidiary questions, as discussed in Section 7.2.1.

The various aspects identified in these stories have been analysed and a theory has emerged that can assist in identifying what should, or should not, be done to achieve a beneficial project usability outcome. This theory has been enfolded in the literature that has supported various aspects of the theory. The enfolding has also highlighted gaps in the literature and gaps in this thesis's theory that is bound by the various limitations of the study.

1.6. Overview of study

To achieve this researcher's aim the following outline has been used for this thesis. The thesis follows the structure recommended by social and business research (Neuman 2005; Zikmund 2002) and comprises seven chapters.

Chapter 1	This Chapter is an introduction that provides a background to the study performed, motivation for the research, the aim of the research, and scope. The Chapter concludes by providing an overview of the outlining of chapters for the thesis.
Chapter 2	Literature review covering the definition of usability and the various factors that impact on the definition. Also discussed are usability activities, usability maturity models, usability practitioner issues, and project success factors. The literature reviewed forms the basis of this research and a reference point from which enfolding of the literature is done in chapter 6.
Chapter 3	Presents the research question and subsidiary questions and describes the research process and methodology used in this study. Limitations of the research with attention on research bias are discussed. Participant recruitment and sample size considerations are highlighted. Open-ended interview questions used are described and discussed. The methodological tools used for analysis and software tool used to support analysis are presented.
Chapter 4	Description of research findings based on the analysis of usability practitioner interview transcripts. This does not describe the initial coding performed (which have been placed in an Appendix), but focuses on the resulting set of twenty-seven concepts that have emerged and used as the basis for the theory generated in Chapter 5.
Chapter 5	The analysis and theory development, that will enable the answering of the research question, is presented in this chapter. The essence of the concepts presented in the previous chapter are examined and grouped into themes. Relationships are identified to aid in the grouping of concepts into themes and significant relationship concepts identified between themes. A theory emerges that describes the impacts on a usability outcome.

Chapter 6	Literature comparison and contrast is performed that will enfold the current literature with the theory developed in the previous chapter. This will provide the emergent theory with grounding with existing literature, and highlight the theory's contribution to knowledge.
Chapter 7	Conclusion seeks to present the theory in light of answering the research question. Provide a discussion of the implication of the theory with research, practice, education and information systems. List limitations of the study presented. Finally, highlight future area that further research can be done to extend this study.

CHAPTER 2

2. Literature Review

This chapter will provide coverage of the literature across the various areas that underpin the theory generated by this thesis. As discussed in the research design and methodology chapter (chapter 3) this literature provides a secondary source of data. It provides the basis for comparison to enfold the theory generated from the findings (Chapter 4) and the resulting analysis (chapter 5) with the literature (chapter 6).

This chapter will provide a map of the literature on which the understanding of usability was obtained by this researcher, the terminology and perspectives that exist. This chapter is part of the research process (Eisenhardt 1989) described in chapter 3 providing a secondary data source that is used to compare and contrast the findings of this thesis. From a research process perspective, this secondary data was used to validate and improve the rigour of the theory generated.

This chapter is structured as follows:

- Why is usability important?
- Defining usability and usability activities
- What is a usability activity?
- What is a usability outcome?
- Usability Practitioner
- The Usability process

The focus of the literature review is to provide a review of the usability literature that impacts on the usability outcome. It also provides background of the various parts of the research question and sub-questions that are being answered by this thesis.

2.1. Why is usability important?

The concept of usability originates from and is part of the area of HCI, which describes a multi-disciplinary approach to bridging the gap between human's goals and technological devices (Preece et al. 1994). Gillan and Bias (2002) describes the 'emergence of a new applied scientific discipline, usability science'. The AS/NZS 4216 (1994) Standard, which is largely a replica of the International Standards, describes usability as an attribute of software quality. Therefore the performance of usability activities is more important by virtue of industry standards and the credibility and significance afforded by the research community. These descriptions of usability vary, but ultimately describe a discipline that requires usability professionals to perform various usability activities in order to bridge the ever widening gap between users, tasks and the IS.

Web applications have lifted the bar on the importance of usability. Nielsen (2000) says 'Usability rules the web. Simply stated, if the customer can't find a product, then he or she will not buy it. The web is the ultimate customer empowering environment. He or she who clicks the mouse gets to decide everything'. The increased focus on accessibility issues has increased usage of IS by disabled users (Chisholm, Vanderheiden & Jacobs 1999). The ubiquitous nature of the web and the increased focus on the provision of systems for disabled users has increased the user community for web applications to 'everybody'. This is a dramatic change from the initial set of users of IS that focused on inventors, enthusiasts and/or business professionals (Shneiderman 1998). This further fuels the argument that the performance of usability activities in the design and evaluation of an interface is an important aspect of the IS.

Organisations and project teams are always questioning the importance of usability. When the usability maturity of an organisation is low, the performance of usability is dictated by the arguments put forward by a cost-benefit analysis. Rajanen and Iivari (2007) have analysed the literature and described a usability cost-benefit analysis framework, see Table 2-1. They have then interviewed various stakeholders of a project team to discover alternative reasons for performing usability. Rajanen and Iivari (2007) discovered an alarming viewpoint in their study in relation to why project sponsors may want usability. This includes 'taming the customer' and 'improving the image of the company' as goals of the organisational management. This shows a lack of maturity and understanding of usability and the benefits it can provide.

	Development context	Use Context
Benefits	Increased Sales Reduced support costs Reduced development costs Reduced training costs	Reduced training time Increased productivity Increased (customer, user) satisfaction Reduced staff turn over
Costs	One-Time costs Recurring costs Redesign costs	

Table 2-1: Analytic framework for empirical analysis of usability costs and benefits (Rajanen & Iivari 2007)

The literature discussion examines various ways in which a cost benefit analysis can benefit the introduction and performance of usability. Donahue (2001) discusses performance of a usability as requiring a 'cost-benefit analysis might be a necessary first step in introducing usability into your organization or a particular project'. As part of a project the estimation of costs and benefitsneeds to be obtained befor the performance of usability activities.Sousa et al. (2005) describe five advantages, that improve the return on investment (ROI) when performing their UPi model within an organisation. These advantages include: usability and user satisfaction, facilitate integration and communication, productivity, reuse, and reduced development cost.

Lund (1997) describes two alternative measures for improving the value placed on usability. First, enable usability involvement at IS project inception. Secondly, usability involvement from the start of a project can improve the IS created and decrease the costs involved in development.The biggest value to a project and organisation is the generation of ideas to support both innovation and IS development. Other value propositions are discussed to improve the total value provided by usability. This research further highlights the need to promote usability cost benefits to project stakeholders before project inception (innovation stage) and during a project.

The importance of usability, improving the value and credibility of usability, is growing within organisations. The literature looks to usability cost-benefit analysis to highlight the importance. Organisational requirement of adherence to standards has increased the importance placed on usability. The emerging ofaccessibility laws that require the performance of usability and the changing types of IS, such as web and mobile applications, emphasise the importance of usability.

2.2. Defining usability and usability activities

This section will focus on the various pieces of literature that examine the development of the concept of usability. It will look at the definition of usability, as provided in the literature, and then provide a broad definition for this thesis. Then a discussion of usability activities, highlighting the various evaluation and design activities discussed in the literature.

2.2.1. What is usability?

Usability has its academic origin in the area of HCI, which attempts to bridge the gap between human's goals and technology (Preece & Lazar 2007; Preece et al. 1994). This is being done by introducing the human issues into the design of interactive systems, and by devising practical techniques to observe human behaviour and observe their performance. The SIGCHI (Hewett et al. 1992) definition of HCI as a discipline refers indirectly to usability: 'Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them'. This section will define the term usability, how it is depicted in this research, and the definition employed by this research.

Many researchers have attempted to define usability (Bevan, N, Kirakowski & Maissel 1992). A recent usability survey (Folmer & Bosch 2004) concludes that 'authors have different opinions on how to measure usability.' This lack of consensus has led to a plethora of similar definitions. These definitions often have common elements that include the stakeholders, tasks being performed, an IS and an environment or context of use.

The New Penguin Dictionary of Computing defines usability as 'a property of any complex system in which humans interact with machines that measure how comprehensible and convenient the operator finds the user interface' (Pountain 2001). An online dictionary (Dictionary.com 2011f) defines usability as 'the effectiveness, efficiency, and satisfaction with which users can achieve tasks in a particular environment of a product. High usability means a system is: easy to learn and remember; efficient, visually pleasing and fun to use; and quick to recover from errors.' Both of these dictionary definitions describe the essence of usability. The first focuses on the *comprehensible* and *convenient* usage of a system by users as the key usability attributes. The second suggests two sets of attributes: '*effectiveness, efficiency*, and *satisfaction*' and '*easy to learn* and *remember*; *efficient*, *visually pleasing* and *fun to use*; and

quick to recover from errors'. Both dictionary definitions mention users, performing tasks, with an IS.

Brian Shackel (1981), was one of the first researchers to propose a broad definition of usability. He states that usability is '[a system's] capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and support, to fulfil a specified range of tasks, within the specified range of environmental scenarios'. This was a very comprehensive definition referring to a specified range of users, tasks, and contexts, and describes two key usability attributes, namely *ease of use* and *effectiveness*.

In Preece et al.'s book (1994, p. 722), usability is defined as 'a measure of the ease with which a system can be learned or used, its safety, effectiveness and efficiency, and the attitude of its users towards it'. In this definition, *safety* is identified as another important usability attribute to reflect the fact that we are no longer dealing with desktop machines, and extent to which the context of use can determine the overall usability of the interactive system when used in the medical arena or used inside a car or an airplane, for example. Other usability attributes in this definition include *effectiveness* and *efficiency*. In a more recent publication, Preece et al. (2002) distinguished between two types of usability attributes: 'usability goals' (namely *effectiveness*, *efficiency*, *safety*, *utility*, *learnability*, and *memorability* - which seem to have a direct impact on the performance of the user) and 'user experience' (e.g. *satisfying*, *enjoyable*, *fun*, *entertaining*, *helpful*, *motivating* etc. – which seem to effect the user references or subjective satisfaction).

Krug (2000) argues that usability is 'not rocket surgery'. Usability is 'making sure that something works well: that a person of average (or even below average) ability and experience can use the thing – whether it's a web site, a fighter jet, or a revolving door – for its intended purpose without getting hopelessly frustrated'(Krug 2000, p. 5). Emphasis here is being placed on the ability of the user to do the task at an expected level of expertise, to signify the importance of user modelling and theneed to design interactive systems that match *users experience* and *skills*.

Jakob Nielsen and Ben Shneiderman (Nielsen 1993; Shneiderman 1998) placed usability within a wider perspective, namely system acceptability (see Figure 2-1), and distinguished between the usability and utility of the system. Nielsen (1993)identified five key attributes of usability that apply to all aspects of a system with which humans interact. The common attributes are:

- *ease of learning* (learnability),
- *speed of performance* (efficiency),

- *low error rate*(accuracy),
- *retention over time* (memorability), and
- *user attitude* (subjective satisfaction).

These general usability attributes are commonly used to measure the usability of an interface design and its interaction style.

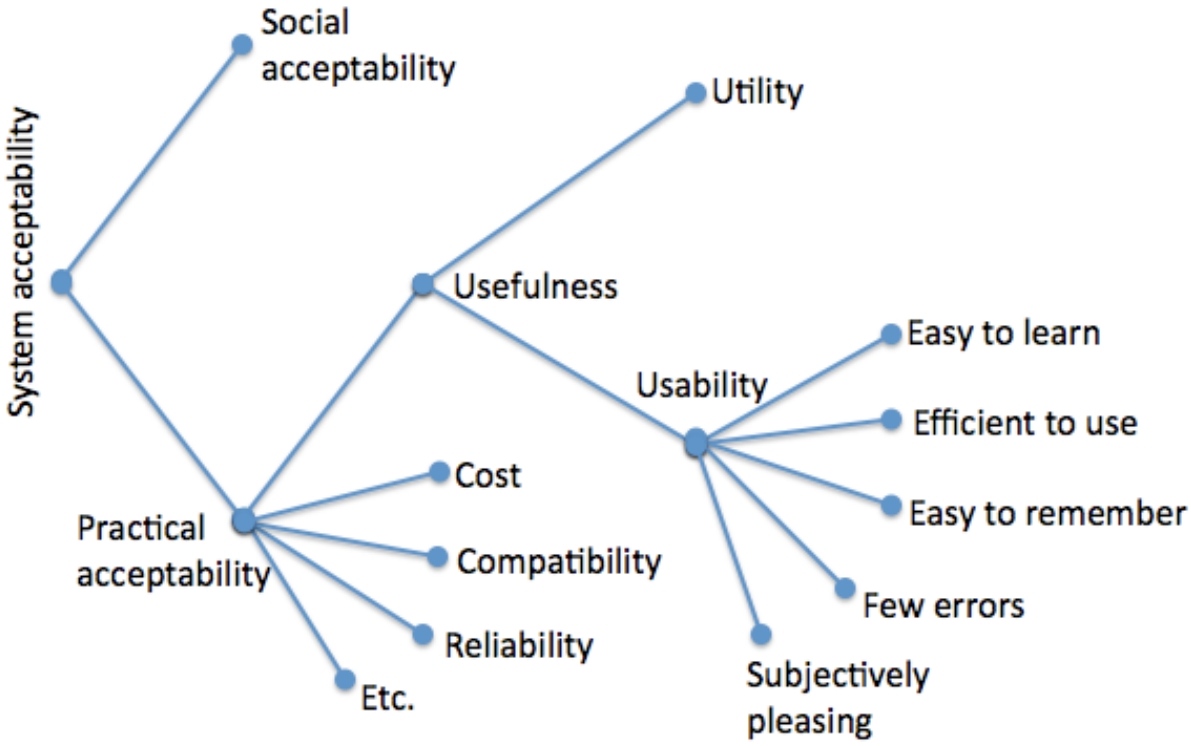

Figure 2-1: Nielsen's (1993) model for system acceptability

A commonly referenced definition of usability is the one stated in a technical report (9241-11.2) produced by the International Standards Organization (ISO/DIS_9241-11.2 1997): Usability refers to 'the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use'. In this definition, *effectiveness*, *efficiency* and *subjective satisfaction* are considered the key attributes of usability.

A very broad, catchall definition is presented by Shneiderman (2000) to describe the term 'universal usability'. According to Shneiderman, 'Universal usability will be met when affordable, useful, and usable technology accommodates the vast majority of the global population: this entails addressing challenges of technology variety, user diversity, and gaps in

user knowledge in ways only beginning to be acknowledged by educational, corporate, and government agencies'. In other words, a universal design should respect and value the dimensions of diversity intrinsic in human capabilities, technological environments and contexts of use. Universal usability, however, does not imply a system that is well designed for one culture will necessarily be usable in a different culture. The term 'local usability'(Hekkala, Iivari & Halonen 2008; Smith et al. 2007)has also been introduced to acknowledge that diverse cultures, languages, and regional regulatory restrictions influence how the targeted audience perceive and use interactive systems.

The concept of actability is directly related to usability, but the emphasis is on the ability of the user to perform (interact) with a system to accomplish the task in a business context: 'An IS's actability is thought of as its ability to perform actions, and to permit, promote and facilitate users to perform their actions both through the system and based on messages from the system, in some business context.'(Cronholm, Ågerfalk & Goldkuhl 1999).This definition highlights the *permit*, *promote* and *facilitate* attributes for users, performing tasks, with a system in a business context.

Nigel Bevan (1995) identified a broad approach to usability as 'quality of use'. According to Bevan, 'Quality of use should be the major design objective for an interactive system: does the product enable the intended users to achieve the intended task?' This approach directly links quality of use to the concept of usefulness - it is not enough for the graphical user interface to be well designed (that is, usable); it should also have high utility. Utility refers to the right system for the right users and the right task. For example, a well-designed desktop calendar management system for professionals will not have the same level of utility if used by another category of users within a different context of use –say, a taxi driver using the software inside the car.

Nielsen (1993) describes usability as different to utility in the 'system acceptability' model. This distinction conflicts with Bevan (1995), who sees utility as a key component to 'quality of use' and hence impacts on usability. Preece's (2002) perspective leans more to a HCI with a broader set of usability attributes. Krug (2000) and Shneiderman (Universal Usability) focus of the usability of everyday designs for everyone where Actability (Cronholm & Goldkuhl 2005) focuses on business context. Shackel (1981), Nielsen (1993), Preece (2002) and the dictionaries'(AskOxford 2011; Farlex 2011; Pountain 2001) definitions focus on usability of users performing tasks while interacting with an IS.

Despite the different attempts to describe the characteristics of well-designed graphical user interfaces, no standard definition of usability exists. There is also no agreement reached among researchers in relation to usability attributes. Others have discovered that the 'meanings of usability are often blurred or poorly defined, and with their constant changes reflect the characteristics of the artefact that we use on a daily basis'(Gamberini & Valentini 2003). In synthesising the definitions and extracting the key aspects, we hope to discover the deficiencies and strengths in current definitions.

The definitions (AS/NZS_4216 1994; Dictionary.com 2011f; ISO/DIS_9241-11.2 1997; Krug 2000; Pountain 2001; Preece, Rogers & Sharp 2002; Preece et al. 1994; Shackel 1981; Shneiderman 2000), in general, seem to suggest that there are four common aspects that impact the usability of the interactive system. These are: the user, the task, the technology and the context of use.

Common Usability Threads	Description
User	The diversity of users that are affected by the use of the IS.
Task	The range of tasks that can be performed with the technology.
Technology (IT System)	The Technology being used as a medium for users to perform certain tasks. This technology can range between purpose built devices to application running on various operating systems that are local or networked, etc. The device, the input and output mechanisms, the operating system and graphic toolkit being used can all have and impact on the interaction.
Context	The environment or social/organisational setting in which the technology will be used to perform tasks by users.

Table 2-2: Summary of the common aspects to a usability definition

To develop a usable system, usability practitioners need to know the targeted users, analyse and understand the tasks, understand the potential and limitation of the technology, and consider the environment (conditions) in which the system will be used. However, the attributes of usability that describe 'a measure of how well actions are being performed with an interface' do differ from one definition to another. These attributes are commonly used for usability goal setting and benchmarking of anIS throughout a project lifecycle. Usability practitioners may use different usability activities to measure usability, which is usually based on articulated usability attributes.

Why do the attributes of usability tend to differ from one definition to another? Interfaces and interaction styles have gone through various generations. Interfaces may have started with simple

switches and light bulbs, then punch cards and command line interfaces, now more commonly we have progressed through to full screen, form filling and graphical interfaces (Shneiderman 1998). At each generation of interfaces, lessons were learnt which enhanced the next generation. Now and in the future new technologies are being explored, such as: voice, gestures, touch, and natural language interfaces. The interesting thing about each of the generations of interfaces is that the target user group has grown. It started with only inventors and experts, and was then followed by specialised groups without computer knowledge, business professionals, hobbyists, and even people with special needs (Shneiderman 1998). Current systems (such as websites, Playstations, Wii, iPad, iPhone, Kindle, etc…) and the next generations of user interfaces and interaction styles are targeting everybody. The convergence of the computer, entertainment, and telecommunication industries has brought together various interaction styles and added other complexities. Small screen devices have decreased the graphical area size for interfaces, adding other attributes that impact on interaction. Voice recognition presents its own set of issues, which reverts our interaction back to a command line style interface.All this change forces us to re-evaluate the attributes of usability for a given project.

The scenario for a given project will dictate the characteristics of the project that impact on what is usability. These characteristics, once understood, from the research/analysis activities can be used to better understand and articulate the usability attributes that define usability for a given project. The usability perspective employed by a practitioner in the performance of usability activities can vary. Uldall-Espersen (2007) describes five frequently observed significant usability perspectives. These include:

1) *Interactive object* concerning whether users are able to successfully perform action through the interface of an IS.

2) *Task* concerns the ability of users to complete desired tasks through the IS

3) *Product* perspective concerns the ability for users to complete desired goals.

4) *Context of Use* concerned with the extent the IS fits within other systems.

5) *Enterprise* perspective focuses on how well the organisational goals are met.

These perspectives compare well to the aspects considered in usability definitions described in this section. The *context of use* and *enterprise* provide an interesting division between organisational goals and environment issues, which is broadly covered in the ‘context’. The *interactive object* covers the ‘user’, ‘task’ and ‘technology’. Where the *product* looks more specifically at ‘user’ and ‘tasks’. These usability perspectives match closely to the threads in

Table 2-2 discussed in this thesis. Highlighting the various perspectives that may generate usability attributes to define what usability is for a given IS. Therefore, to generate usability attributes (goals) there must be consideration made across the range of user goals, list of tasks to be performed, technological constraints and context (organisational and environment goals).

Defining Usability attributes

As has been discussed earlier, each usability definition has a different set of usability attributes. Usability researchers have varying opinions on how to define and measure usability (Folmer & Bosch 2004). The AS/NZS 4216 Standard(1994), which is largely a replica of the ISO 9126 International Standard, describes attributes of software quality. One of these attributes is usability, which is defined as 'a set of attributes that bear on the effort needed for use, and on the individual assessment of such use, by a stated or implied set of users'(AS/NZS_4216 1994). Here the definition focuses on *a set of attributes* required to perform the task by the user of theIS. What is interesting is that the *set of attributes* has been left open to be defined by the evaluator of the system. This suggests a strategy is required to consider the various attributes of a complex system that would define its usability.

As indicated earlier, to identify the usability attributes, interaction designers and usability specialists need to know the targeted users, analyse the system tasks, understand the potential and limitations of the technology, and consider the environment (conditions) in which the system will be used. Usability research believes that identifying the relevant usability attributes for a situation is the first step toward a successful human-centred development: usability attributes are included in the usability requirements and in turn become quantified usability specifications (Nielsen 1993). Consequently, the relevant usability specifications will have a crucial impact on the development process, often dictating the usability activities to be performed and the usability attributes to be considered. On one hand, it will become a considerable challenge for the interaction designer to translate the usability specifications into an effective interaction design that supports the best interaction styles to perform the user tasks. On the other hand, during the design and development process, the usability specialist should select the best usability evaluation technique in order to assess each one of the relevant usability attributes and ensure that the system meets the usability specifications. Fitzpatrick and Higgins (1998) supports the idea of articulating usability attributes to define usability for a given project, and suggests three strands to consider: software quality (utility), statutory obligation, and HCI. The importance of

defining a set of usability attributes for a givenIS, provides a coherent set that can be used to assess the project outcomes, especially by management or project sponsors.

'Going beyond usability' (Dillon 2002) by better articulation of the usability attributes, provides a better definition of usability, providing measures based on the usability attributes. There needs to be upfront discussions that look beyond traditional usability to incorporate:

- What are the user's tasks that are being supported?
- What does the user achieve from the interaction?
- How the user feels about the engagement?

Lessons learnt by Dillon (2002) are that all aspects of user experience must be reflected when eliciting user data, and that user experience is dynamic that highlights that it will change over time based on various usability attributes. Ultimately, this research looks to 'user data is the best indicator of interaction quality'. All these lessons look to go beyond the standard set of usability attributes as discussed by other researchers (presented earlier by Nielson (1993), Shneiderman (1998), Preece (2002), etc…) and shown in Figure 2-1.

Articulating the usability attributes becomes even more crucial when some of these attributes compete, or even conflict, with each other within the same design. There is a need for usability practitioners, or someone on the project team, to balance or prioritise these usability attributes. It is important for a usability practitioner contributing to design and joining other stakeholders in 'the difficult work of weighing up tradeoffs to create a solution' (Cooper 1999). All project stakeholders need to be involved to aid in this balancing of usability attributes.

Alternative concept: Actability

The concept of actability (Ågerfalk, Pär J. 2003; Goldkuhl, Göran & Ågerfalk 2002) is one based on various theories of communication and social actions. The definition of actability reads: 'We define actability as an IS ability to perform actions and to permit, promote and facilitate users to perform their actions both through the system and based on messages from the system, in a work practice context'(Cronholm & Goldkuhl 2005; Goldkuhl, Göran & Ågerfalk 2002). The processes and principles (Cronholm & Goldkuhl 2005) associated have a clear focus of evaluating an IS within a Business Context.

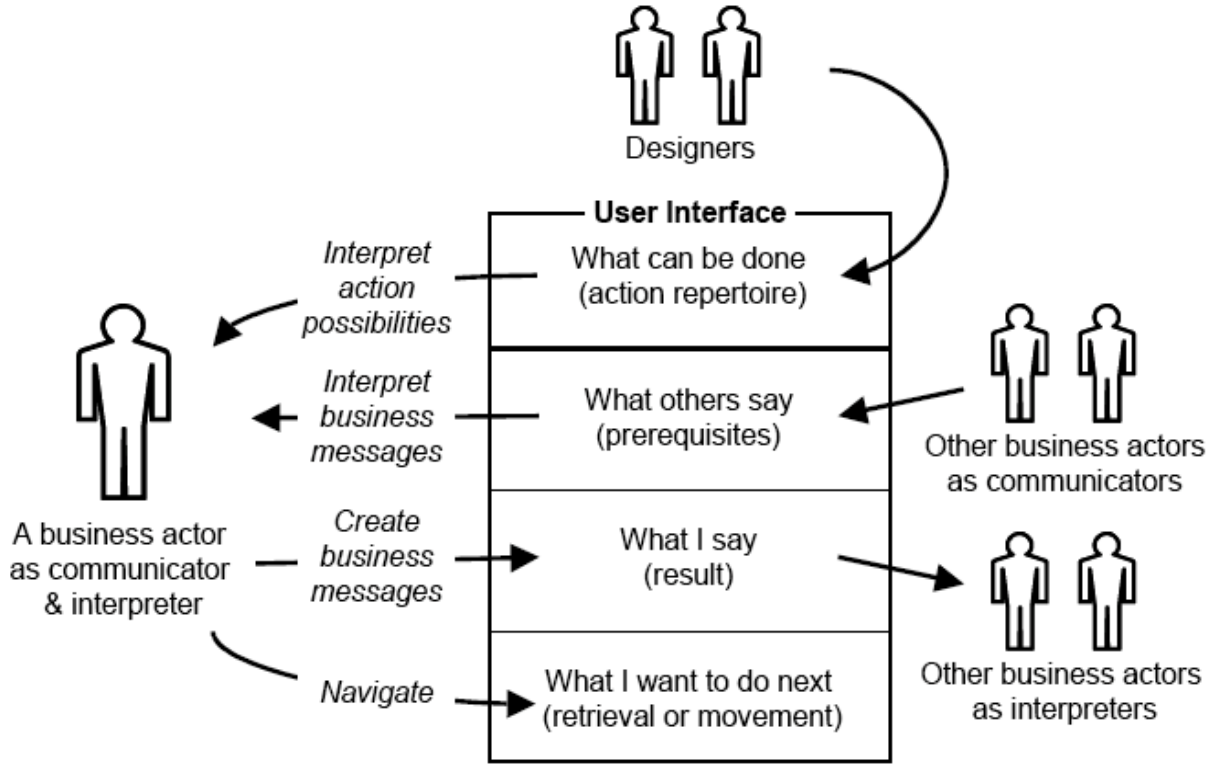

Figure 2-2: An actability perspective on user interfaces, taken from (Sjöström & Goldkuhl 2003)

An examination of the actability principles against the other such guidelines in the usability area, i.e. Heuristics (Nielsen 1993) and eight golden rules (Shneiderman 1998), highlights the distinct differences and focus of this alternate usability concept.Table 2-3 provides the list of two commonly referenced usability guidelines against these actability principles.

Nielsen's (1993) Heuristics	Shneiderman's (1998) Eight Golden Rules	Cronholm &Goldkuhl's (2002; 2005) Actability Principles
Visibility of system status	Offer informative feedback.	Can immediately see if the intended action is executed (clear feed back)
Match between system and the real world		Understand concepts used (familiar and understandable vocabulary)
User control and freedom	Support internal locus of control.	Can easily move to another document (easy to navigate)
		Able to "say" what he/she wants through the system (satisfy communication needs)
Consistency and standards	Strive for consistency.	
Error prevention	Offer simple error handling.	
Recognition rather than recall	Reduce short-term memory load.	Know who has said what (personalized information)
Flexibility and efficiency of use	Enable frequent users to use shortcuts.	Understand consequences of proposed and performed actions (action transparency)
Aesthetic and minimalist design		Offer a good support for business actions
Help users recognize, diagnose, and recover from errors	Design dialog to yield closure.	Can easily access information of what has been done previously (easy access to action memory)
	Permit easy reversal of actions.	
Help and documentation		Easy to understand what can be done with the system (clear action repertoire)

Table 2-3: Comparison of different usability guidelines against the actability principles

The concept of actability, its processes and principles, have been applied to an IS in a business context with success (Ågerfalk, Pär J. et al. 2002). Actability describes the actions and communication (both context and intent) perspective of anIS, in its role within a business context, rather than as a tool being used by users to perform tasks. This perspective on usability is heavily weighted towards the 'social actions performed by the IS's use within a business context' (Ågerfalk, Pär J. et al. 2002). Universal usability (Yetim 2004) is a new concept which builds on the traditions of IS actability, by extending it to include human communication and action competence.

This concept highlights the importance of being explicit when defining what is critical to a project or organisation. Providing the appropriate usability perspective sets the usability

mindsetfor a project. This thesislooks to provide a uniquely focused usability mindset which improves the usability outcome for the business problem being solved by an IS.

Summary

The definition of usability has evolved over time, and usability researchers have varying opinions on how to define and measure usability. The definitions, in general, refer to four common threads that need to be understood in order to enable the development of a usable interactive system. These are, the targeted users, the tasks, the type of technology, and context of use. However, these four threads are dynamic and keep evolving over time making it very difficult to agree on a fixed set of usability attributes. In other words, the usability attributes are application specific and driven by these four common threads that lead to continual change as the four threads change. For example, users can evolve from beginners to experts which impacts on the user thread.

Usability attributes have an impact on the development process because they become usability requirements and, in turn, quantified usability specifications, which will have direct impact on the design outcome. Usability specialists will also have to conduct usability evaluations to ensure that the final system will meet these usability targets.

This thesis will use this broad usability definition:

> *Usability is the set of usability attributes that describes the interaction of, in human functional terms, the specified range of users, given specified training and support, to fulfil a specified range of tasks, within the specified range of environmental scenarios and organisational contexts for a specific usability situation.*

2.2.2. What is a usability activity?

Usability activities are conducted throughout a development lifecycle in order to enhance the user-centred design and ultimately the creation of a usable IS. Nielsen (1993) describes a set of such activities, that may include: user and task analysis, competitive analysis, setting of usability goals, parallel design, participatory design, guideline inspection, heuristic evaluations, prototyping, empirical testing, iterative design, and ongoing feedback from field use. Other activities, described by various researchers, include usability evaluation methods, such as:

inspection methods (Nielsen & Mack 1994), participatory heuristic evaluation (Muller et al. 1998), web heuristic evaluations (Instone 2011), cognitive walkthrough (Nielsen & Mack 1994), web cognitive walkthrough (Blackmon et al. 2002), paper prototyping, and formal usability testing (Rubin, J 1994). Many of these activities require consideration of and/or focus on the set of usability attributes and usability characteristics for the given IS. Web developers, usability practitioner or automated tools may be used to perform these usability activities.

The literature does discuss the performance of usability activities and the effect that usability practitioners have on the performance of the process and the usability outcomes(Gray & Salzman 1998a, 1998b; Hertzum & Jacobsen 2003), the research predominantly looks at expert evaluation. The thesis also presents a large portion of literature that shows a great focus on project stakeholder involvement.

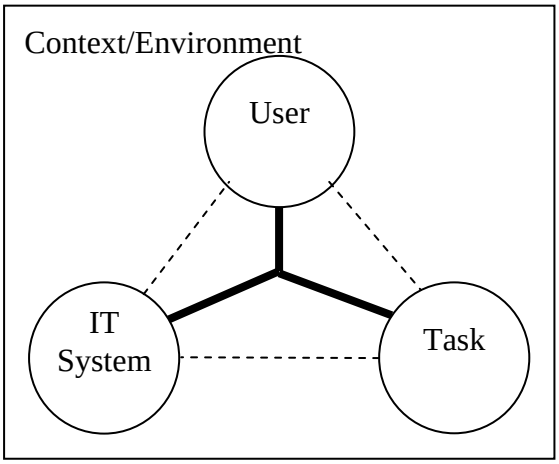

Figure 2-3: Common Usability Factors, adapted from (Cronholm, Ågerfalk & Goldkuhl 1999; Shackel 1981)

Usability activities can be broken into the activities to generate projects' usability specifications and activities that employ various evaluation techniques to discover usability problems. The usability specifications focus on the goals of the project, the users involved, and the tasks they will be performing, and how the interaction and interface will enable this. The problem with usability activities is that many of them focus on a binary relationship between user and system or system and task or user and task (see dotted lines in Figure 2-3), with various degrees of consideration for the context and/or environment. Usability activities have predominantly focused on one of these binary relationships, while ignoring the other factors that impact on the interaction. Examples of this include the cognitive walkthrough which focuses on the tasks using the IT System or a heuristic evaluation that focuses on the guidelines (mainly user focused) interacting with the IT System.

The aim of the usability activities is to focus on the ternary relationship between user, system and task, with due consideration being given to the context or environment (i.e. the solid lines in Figure 2-3). The context or environment can introduce other project elements that may impact on usability activities performed. Some of these considerations include political issues and moral issues (Wilson, C 2007).

The following sections look to examine the various aspects of usability activities, with a focus on evaluation techniques. The focus on evaluation is provided because most of the practitioner's interviewed focused their discussions on the evaluation activities and this is where the literature has a deep focus. It will start with a discussion on research that examines the use of usability evaluation technique in a project lifecycle and follow with a discussion on expert and participant orientated techniques. Finally, it looks at the validity and effectiveness of usability techniques.

Usability Evaluation Activity

What is a usability evaluation activity (UEA)? This is an activity performed during a project lifecycle in order to examine how well anIS's interaction style and interface design meets the usability requirements of a project. UEA can be used during all phases in a project lifecycle. They can be adapted to suit the given context or phase in which it is applied.

When learning and using a usability technique for a given situation, it is important to know the method sufficiently, so that a usability practitioner can modify the activity as needed. This flexibility in performance requires thorough understanding of all the steps and comfort (experience) with adapting the activity to suit the situation at hand (Löwgren & Stolterman 1999). This flexibility in the performance of usability activities can improve the results and hence the usability outcomes for a project.

Fitzpatrick and Dix (1999) have looked into appraisal of usability evaluation methods, in order to examine the affects of changing focus on the quality attributes of what makes an IS usable. This research has shown that is important to select usability evaluation methods that fit a given scenario. It is not enough to just perform standard usability activities throughout a development process. Usability practitioners must be more explicit in the selection of usability evaluation techniques that will have specific impacts for the users and other stakeholders of a project (Cockton 2006). One of the key stakeholders is management, from which the most support is required (Cockton 2006).

Cockton (2006) describes focus, fit and fervour as essential factors for the interplay between design and evaluation. It's not enough to simple go through the process of a usability technique and produce results. Usability evaluation methods need to be focused and fit to exploit the evaluations results. The analysis and research done in a project is critical in improving UEA fit in the project. Usability practitioners who apply the usability evaluation methods must be competent. The buy in from management and other project team members, such as developer, (fervour) is also an important aspect to success of UEAs.

An early piece of literature discusses many usability activities that can support the usability with a project lifecycle (Maguire 2001). This literature supports many of the aspects that lead to a successful usability outcome which include: careful planning of the usability activities to be done during the project lifecycle, understanding the context of use to support evaluation activities, understanding user requirements which can be assessed, be flexible and iterative in when applying usability activities, and look to performing both expert and participatory evaluation activities. This research highlights the importance on focusing on planning and performance of usability evaluation activities to achieve useful usability findings that can positively impact the usability outcome for the IS.

Gamberini and Valentini (2003) discussed the various usability activities to consider when evaluating the usability of web applications. These include: Log analysis, heuristic evaluation, cognitive walkthrough, questionnaires, interviews and focus groups, think aloud protocolco-discovery method, contextual inquiry, and object-oriented and scenario based techniques. This provides further evidence of the key evaluation activities promoted by the literature as ones to consider in practice.

Taxonomy of usability evaluations (Fitzpatrick 1999) describes various categories of usability evaluation methods, see Table 2-4. This literature looks to provide various conditions that enable appropriate selection of usability evaluation activities. It highlights the consideration of whether a real computer or IS is available or a prototype of an IS is available to be evaluated. It also considers whether there are real users available to participate in the usability evaluation activities or if users will be represented by user advocates.

	Low	High
High	**Hard Review** • Heuristics methods	**Real World** • Observation • Questionnaire • Interview • Empirical methods • User groups
Low	**Virtual Engineering** • Cognitive walkthrough • Heuristic methods • Review methods • Usability Audit • Model methods	**Soft Modelling** • Observation • Questionnaire • Interview • Empirical methods • User groups

Real system / Representational system

Representational user / Real user

Table 2-4: Taxonomy of usability evaluation activities (Fitzpatrick 1999)

This taxonomy describes various situations where particular usability evaluation activities maybe more suited. For example, having a real IS and real user participation allows consideration of participatory orientated usability evaluation activities. Conversely, having no user involvement and no real IS (i.e. prototypes only) is better suited to expert oriented usability evaluation activities. This provides some interesting factors to consider for usability practitioners when selecting usability evaluation activities in practice.

Actability theory discussed six generic evaluation types (Cronholm 2004) that highlight an interesting taxonomy of evaluation method categories. Figure 2-4provides two dimensions, firstly, the ‘as such’ situation where an expert only is used to evaluate the system or ‘in use’ where you have a real user participating in the evaluation. Secondly, the evaluation conducted may be done based on a set of usability goals, or a set of criteria as defined for the given information, or free of any goals or criteria.

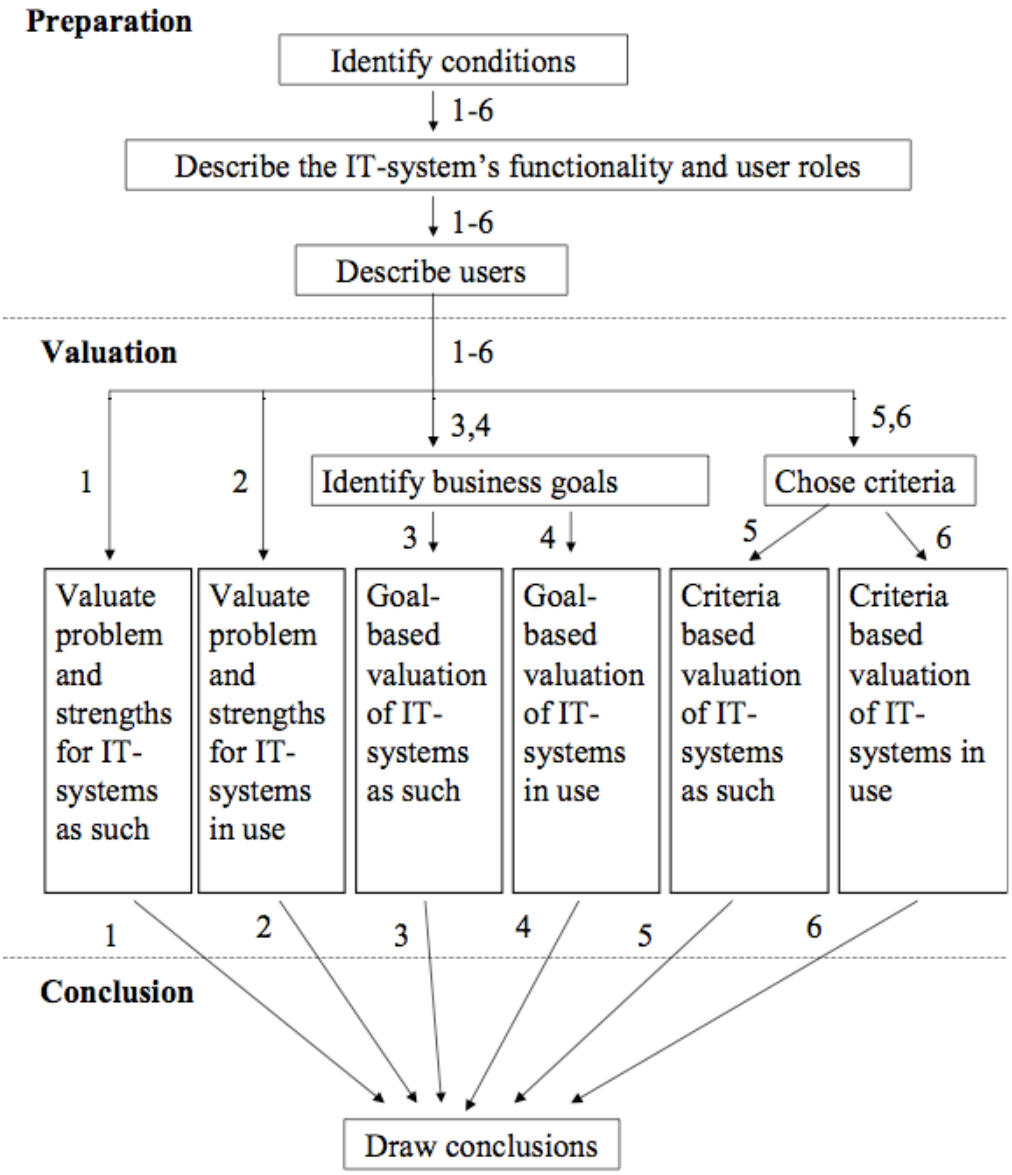

Figure 2-4: Actability processes six generic evaluation methods.

This provides an interesting set of six generic types of evaluation activities, where various factors can dictate the type of evaluation that will be performed. The access to project stakeholders dictates the involvement attainable or the set of usability requirements defined. The usability requirements may include usability goals (business goals and/or user goals) or a set of predefined criteria (Apple.com 2011a; Chisholm, Vanderheiden & Jacobs 1999; Instone 2011; Muller et al. 1998; Nielsen & Molich 1990; Sun_Microsystems 1996) or explicitly defined set of usability criteria(Cronholm 2009; Cronholm & Bruno 2008).

Expert orientated usability activities

The selection and performance(Hollingsed & Novick 2007) of expert evaluations (usability inspections) are still actively performed, especially the heuristic evaluation (Nielsen 1993) and cognitive walkthrough (Nielsen & Mack 1994) methods, within project lifecycles. The following section will provide a review of the various expert evaluations in the usability literature.

The heuristic evaluation was first put forward by Nielsen (1993) as a discount (low cost) usability evaluation activity(Nielsen 1994, 2009). Nielsen (2011a) describes the simple steps involved in conducting a heuristic evaluation, which includes: get some experts, experts evaluate on their own (twice) using the heuristics[1] as a guide, then compare findings, and experts provide feedback. It has also been put forward by Nielsen (2011a) that five expert evaluators is enough to discover the majority of the usability problems. This expert evaluation does not require extensive planning to setup and perform;it can be done early in a project lifecycle and does not require extensive training to perform. It does rely heavily on the preconceived ideas and experience of the evaluator (Hertzum & Jacobsen 2003). This UEA relies on a group of usability practitioners being user advocates while performing the evaluation to discover usability problems.

There have been some enhancements to the heuristics evaluation. Muller et al. (1998) look to expand the list of expert evaluators to include IS project team members and subject matter experts. They also added five additional heuristics (which are more task orientated), based on the observations made of experts performing heuristics evaluations and an analysis of the usability problems discovered. The online computer library center (oclc.org 2011) added four new heuristics that provided some additional interaction and aesthetic considerations. Chattratichart and Lindgaard (2008) looked to improve the usability problem profiling.

Chattratichart and Lindgaard (2008) mentioned that the Heuristics Evaluation is ‘the most popular of usability inspection methods’, it may be the most popular for those that want to

[1] Nielsen’s (1993) heuristic included: Visibility of system status; Match between system and the real world; User control and freedom; Consistency and standards; Error prevention; Recognition rather than recall; Flexibility and efficiency of use; Aesthetic and minimalist design; Help users recognize, diagnose, and recover from errors; and Help and documentation.

perform an expert evaluation. In a survey (Gulliksen, Boivie & Göransson 2006) of 100 usability practitioners, the heuristic evaluation rated third behind usability testing and prototyping. It was found (Rosenbaum, Rohn & Humburg 2000) that these informal discount (low cost) expert evaluations, such as heuristic evaluations, are widely used but ranked as less effective than more formal evaluation, such as usability testing.

The literature has examined the heuristic evaluation method from various contexts: effectiveness of various types of evaluators, and the number of evaluators, and the degree of expertise (i.e. novice or expert). The effect of the evaluators (Hertzum & Jacobsen 2003) on this evaluation activity has a significant effect on usability findings, as described by Hertzum & Jacobsen .(2003) because of "vague goal analyses leading to variability in the task scenarios", "vague evaluation procedures leading to anchoring" and "vague problem criteria leading to anything being accepted as a usability problem".There has been a lot of research discussing the effects of evaluator in various aspects of these evaluation activities. The validity of these studies have been questioned by Gray and Salzman (1998a, 1998b), based on a number of concerns they have in the conducting of the studies. They questioned the sample size used, the type of user involvement and faults in the research design.

Cognitive walkthrough techniques look to tell a story, step by step, on the performance of a particular task (Blackmon et al. 2002; Nielsen & Mack 1994). The cognitive walkthrough has some variation that includes a web application focused cognitive walkthrough (Blackmon et al. 2002) or a combined version that incorporates heuristic evaluation (Sears 1997). A combination of heuristic evaluation and cognitive walkthrough provides a more comprehensive expert evaluation. Sears (1997) describes an expert evaluation, called heuristic walkthrough, which was shown to be more effective at discovering usability problems. A comparative study (Hornbæk & Frøkjær 2004) of cognitive walkthrough and a psychology based usability inspection technique known as MOT[2], metaphor of human thinking(Frøkjær & Hornbæk 2008), showed that the psychology based usability inspection performed significantly better. There are various studies that compare cognitive walkthrough against other expert evaluations.

Usability audits are normally used with a set of more concrete guidelines, similar to the heuristics (Nielsen 1993) in a heuristic evaluation. This expert evaluation activity looks to

[2] MOT is a new evaluation technique that is based on a 'metaphor of human thinking'.

examine an interface design and interaction style for compliance to these guidelines. This is usually done by a usability practitioner at various points in a project lifecycle, but more often towards the end of the lifecycle.

There are many guidelines specified in the literature and specified by various commercial organisations. These guidelines are normally a broad high level set of guidelines used for design and evaluation of interface designs and interaction styles. The information about the usage of these in practice is unknown, nothing was found in the literature about it. These guidelines have various contexts for which they have been designed, a sample of these are presented in Table 2-5.

Context	Related Guidelines – Principles – Heuristics
Generic	Nielsen's Heuristics (Nielsen 1993, 2011a) Eight Golden Rules (Shneiderman 1998) Heuristics in Participatory Heuristic Evaluation (Muller et al. 1998)
Device specific	Small Display Screens (Kärkkäinen & Laarni 2002) Context aware mobile applications (Häkkilä & Mäntyjärvi 2006) Effective WAP and M-commerce principles (Condos et al. 2002)
Accessibility	Web Content Accessibility (Chisholm, Vanderheiden & Jacobs 1999)
Business Communication	Actability Principles (Cronholm & Goldkuhl 2005)
Commercial	Apple Human Interface Guidelines (Apple.com 2011a) OpenStep User Interface Guidelines (Sun_Microsystems 1996)

Table 2-5: Various categories of guidelines used for expert evaluations.

Participant orientated usability activities

The observation or direct involvement of users in design or evaluate activities is promoted by many researchers and practitioners. Often the main objective of these evaluations, such as the expert orientated usability activities, is to discover usability problems. Performing usability activities is not just about producing valuable and valid usability data, but is also an opportunity to engage stakeholders (Rohn, Janice A. et al. 2002)including users, IS practitioners and organisational stakeholders. This promotes the selection and performance of usability activities that allows involvement by project stakeholders.

Usability Test

Getting your IS'used in anger'(Cooper 1999; Myhill 2003) is a great way of discovering the real usability issues with it. Usability testing provides an opportunity for users to participate in evaluating the usability of interacting by performing tasks with an IS. A survey of Swedish

usability practitioners indicated ‘a preference for methods that actively involve users’ (Gulliksen et al. 2004). The involvement of users in usability activities is clearly something that is preferable when looking to discover usability problems

Usability testing (Rubin, J 1994) provides the best opportunity for user involvement, through participation or observation. This technique enables quantitative measures and qualitative data to be obtained through simulated testing. This technique involves: determining what needs to be tested, designing the test, getting some users to participate, setting the test environment up, running the test sessions, debriefing the users that have participated, and analysing the data obtained. It has been shown with usability testing it’s not all about the number of participants that are used to participate in the usability testing,the task coverage of the usability testing is just as important when looking to find usability problems (Lindgaard & Chattratichart 2007). Hughes (1999) considersimproving the rigor in performing the usability testing evaluation and the analysis of the qualitative and quantitative data as important.Hughes (1999) research describes how usability testing can be made more credible, transferable and dependable, and hence gain rigor from a research perspective.

Cognitive Walkthrough

The think aloud technique (Gamberini & Valentini 2003) requires participation from primary users in an evaluation activity that requires the participant to talk about what they are thinking while performing various tasks. This is usually used during usability testing (Boren & Ramey 2000) to enrich the data collected during the test scenarios. There have been several communication protocols put forward for use during a think aloud technique (Boren & Ramey 2000; Krahmer & Ummelen 2004).

A co-discovery method (Gamberini & Valentini 2003) looks to involve two participants during a usability test. This provides an opportunity for the two participants to converse and provide a more natural think aloud type technique, where the two participants will discuss the performance of the various tasks scenarios.

Practical field research, as discussed by Rosenbaum (2003), is advocated as valuable way of obtaining requirements about users, tasks and goals. Rosenbaum (2003) promotes various techniques to enable better communication with users, such as:

- Condensed Contextual Inquiry – which is simply the observing and talking with users in their workplace while performing normal activities.

- Ethnographic Interviewing – focuses on the asking of question about the users within the context, how it affects their approach to performing their tasks.
- Field Usability Testing – performing of a traditional usability test, within the realms of the user's workplace. This enables workplace context and related resources to be utilities in the evaluation of the performance of tasks.

There are other usability activities discussed in the literature, which highlightuser involvement as an important factor in its performance. An example of this is 'role play'(Seland 2006) as a design activity that promotes increased user involvement. Seland (2006) study showed that role-play was perceived as useful for:

- Making end users active participants in the development process
- Creating a focus on user needs
- Fast idea creation in early phases of a project, and
- Enhancing the developers understanding of the future context of use.

This role play activity included the user and some project team members, but lacked engagement with project sponsors. Seland (2006) did say this technique was not enough to create an overall understanding of the IS. The role-play usability activity highlights the importance of involvement of project stakeholders in the project lifecycle. It especially targets the involvement of IS project team members in developing a usability understanding. Creating a focus on user needs must be done early within the usability requirements of a project. Here this research(Seland 2006) looks at enabling all project aspects to be elicited early in a project lifecycle.

Design orientated activities

The definition of design is 'to prepare the preliminary sketch or the plans for (a work to be executed), esp. to plan the form and structure of' (Dictionary.com 2011a). A usability practitioner's role often involves the translating of usability requirements and analysis documents into a design. The general field of design looks to focus on product design (Lawson 2006). The book "How designers think" (Lawson 2006) describes design as 'Design involves the analysis, synthesis and evaluation of a problem to produce a solution. Designers are not necessarily the developers or builders, they are not necessarily involved in construction or

development of the artefact. Designers produce a solution that meets the needs of the stakeholders, the tasks to be performed, and the environment it will be working within'. The ideas discussed here are echoed from the usability perspective. Design is about creating a usable product for your primary stakeholders and enabling them to perform their task with the IS given a specific context of use.

Gould and Lewis (1985) have surmised, from 447 surveys, three principles of design for usability. These principles include: Early Focus on Users and Tasks, Empirical Measurement, and Iterative Design. This provides usability practitioners with clear points of required engagement in order to have an impact on the design of an IS's interface design and interaction style. Cockton (2008) argues that its time to move on from these principles, discussing the need for more credible, better grounded and more appropriate principles are needed. This author suggests looking to a set of six worth-centred principles (i.e. commitment, receptiveness, expressiveness, inclusivity, credibility and improvability) as the basis for a framework of methods and approaches to worth-centered design and evaluation.

In order to design anIS to be usable, focus must first be on the analysis of the problem domain. Design relies on this analysis and the resulting requirements document to give direction to the design activities. Gould and Lewis (1985) describe the important of an early focus on users and tasks, this analysis provides key data that aid in the requirements with a view to feed the data into the design phase. Therefore, a big issue in the design ofan IS is the process by which a practitioner translates the gathered analysis/research into an appropriate set of design guidelines producing an appropriate interface design and interaction style.

Once in the design phase of an IS, it is important to enter an iterative process that includes evaluation and re-design. Gould and Lewis (1985) discussed 'Iterative Design' as one of three principles of designing for usability. Other studies have also discussed the merits in having an iterative design methodology to improving usability outcomes (Bailey 1993; Egan et al. 1989).

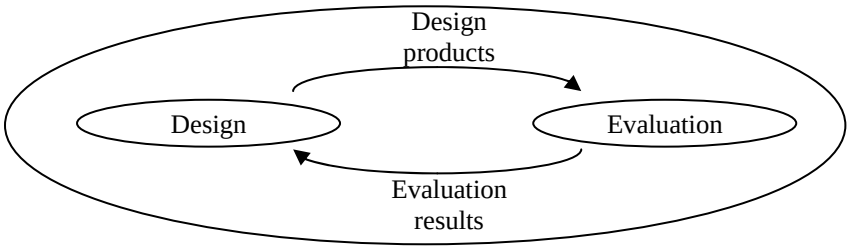

Figure 2-5: The interplay between user interface design and usability evaluation as key activities in software development (Hornbæk & Stage 2006),

The interplay (Cockton 2006; Hornbæk & Stage 2006) between design and evaluation needs to improve in order to increase the success of usability outcomes. Design and evaluation go hand in hand as shown in Figure 2-5. This interplay between interface design/interaction style and usability evaluation is a key activity for any project. The workshop by Hornbæk and Stage (2006) discussed various challenges:

- Focus on empirical studies of industrial scale design projects
- Strengthen the coupling of evaluation and goals/values of the design
- The various form of feedback in which the results of usability evaluation is presented to developers
- The improvement of evaluator's skills.

The key activity performed by usability practitioners is the evaluation and design of the interface and interaction. The major part of an IS's success is often the usability of the design. The literature highlights, for design, the importance of having the right data (i.e. user and tasks analysis), iterative design approach (i.e. evaluation and re-design) and usability measures. The literature also highlights (Cockton 2004) that design and evaluation are not directly linked, it is through the 'interaction' that they are linked. Both the design is focused on the interaction and the evaluation is focused on the interaction, but one looks to create the interface and interaction where the other looks to evaluate the interface and interaction.

In the literature the design and evaluation are interrelated in the usability area. A study of the literature by Wania et al. (2006) revealed seven distinct areas of research that focus on design and evaluation. These included:

- Design theory and complexity,
- Design rationale,
- Cognitive theories and models,
- Cognitive engineering,
- Computer supported cooperative work (CSCW),
- Participatory design, and
- User centered design.

Each of the above groupings provides varying degrees of design and evaluation, they do not have elements of one or the other only. Design is still mainly an art form rather than a science, relying on design and redesign, evaluation activities and prototyping activities (Ferreira, Barr & Noble 2005).

Usability activity Validity and Effectiveness

In order to examine the validity and effectiveness of usability evaluation activities (UEA), there needs to be a mechanism to measure those. These measures can enable practitioners to evaluate the effectiveness of a UEA in different situations. These situations can be categorised by the range of users, a specified list of tasks to be performed, the interaction and interface design of the ICT system and the affects of the context and environmental issues. The literature provides various mechanism for comparing UEAs, such as a set of criteria (Hartson, Andre & Williges 2001), or a comprehensive appraisal grid (Fitzpatrick & Dix 1999), or an effectiveness tree to enhance predictive power (John & Marks 1997), or a common industry format for reporting of usability problems discovered as a result of performing a UEA(Bevan, Nigel et al. 2002; Theofanos 2005). These measurement mechanisms can provide insight into the effectiveness of various usability activities and hence provide insight into the selection of usability activities by ICT professionals for a givenIS.

Problems exist with performing usability activities that impact the desired usability outcome that an ICT professional is striving to achieve. The issues with the performance of usability activities may provide further insight into the validity and effectiveness of a usability activity for an IS.These issues can include: identification of usability problem (Skov & Stage 2005) that vary between experts doing the same evaluation; interpretation by developers' of the output generated by usability evaluation techniques (usability problems) and the severity rating given may differ from the usability practitioners interpretation (Frøkjær & Hornbæk 2004); redesign suggestions need to supplement the usability problems detected (Frøkjær & Hornbæk 2004) with consideration for potential business effects (Cronholm 2004) if usability problems remain; consideration of evaluator affect on a usability evaluation activity's process and output (Hertzum & Jacobsen 2003) can improve usability outcomes; and focus on the usability strengths (Cronholm 2004) of a design can ensure their survival in a design. These are some of the issues discussed in the literature that are important to raising the awareness of aspects that can impact the outcome, validity and effectiveness of performing usability activities.

The effectiveness of many usability evaluation activities for web applications is not known. The literature provides various techniques used for the design of usable web applications. Alva et al (2003) examined various 'methods and tools for the measurement of usability in software products and software artefacts in the web'. Other researchers have examined usability for web applications through the architectural application design, e.g. Usability patterns, and web application modelling(Fraternali 1999; Fraternali & Paolini 2000; Kappel, Retschitzegger & Schwinger 2000; Perzel & Kane 1999). The nature of web application has given rise to development and use of automated usability tools (Brajnik 2000; Ivory & Hearst 2001; Vanderdonckt, Beirekdar & Noirhomme-Fraiture 2004), predominantly for evaluation purposes, this is due to the nature of developing or configuring web applications in 'web time'(Braiterman, Verhage & Choo 2000; Cloyd 2001). Examination of web logs (Spiliopoulou 2000) to evaluate website usability is another technique being used to examine usage patterns and hence discover usability problems. All the discussed web techniques are topical usability techniques being examined to enhancing web usability of the interface and interaction of the web design.

Norgaard and Hornbaek (2006) explored the think aloud technique in practice to discover that the evaluator effects the outcomes of the activity. The line of questioning and probing included hypothetical questions, abstract questions, leading questions, and plain impossible to answer questions. The questions did not focus on trying to understand the problems experienced by users, instead trying to get the user to work out what the problems are. Evaluators must carefully formulate their questions. They need to also review the results of a test straight after it is completed, while fresh in the mind, and not allow a large period of time between the test and the analysis of the results. The study also showed a lack of systematic analysis of the results. It was also found that many usability practitioners were going into a test with a set of preconceived usability problems, which may have distracted them from actually observing other problems. Other research (Haak van den & Jong de 2005) has shown an evaluator effect with the interaction between the 'facilitator and participants' in think aloud evaluations.

A similar study(Clemmensen, T. 2004) looks at various ways that usability practitioner's perform user modelling in a project. It outlines the danger of usability practitioners' tendency during user modelling to create user stereotypes. This user stereotyping can have a negative effect on design and evaluation techniques, providing further research that highlights a possible usability practitioner having an impact on the performance of a usability activity. A study (Hertzum & Jacobsen 1999) looking at the evaluator effect in relation to performance of a

cognitive walkthrough can fall short in considering the actual users, since they will model the user on themselves or they may focus on a very diverse user during the evaluation.

One study (Jacobsen, Hertzum & John 1998) has shown only twenty percent of usability problems detected were the same among four different evaluators. The evaluator effect predominantly is focused on how effective usability practitioners are at detecting usability problems. An analysis (Vermeeren, Kesteren & Bekk 2003) of one hundred and twenty six usability practitioners showed five main groups that caused an analysis of differences in usability problems detected. These include the interpretation of the verbal utterances and non-verbal behaviour, guessing user intentions, difficulty determining the extent of inefficiency or redundant actions, distinguishing the difference between a usability problem and a problem with the test, and inaccuracies in the analysis. This highlights some key areas where each usability practitioner may vary their practice when performing a usability evaluation and interpreting the various data elicited. This study (Vermeeren, Kesteren & Bekk 2003) then goes on to suggest various ways to manage this evaluator effect, by use of automated logging tools to minimise errors in transcription, through discussion with other evaluators about the various usability problems, and engagingmultiple usability practitioners in the usability activity to provide multiple views.

Often evaluators do not see the evaluator effect (Hertzum, Jacobsen & Molich 2002) occurring during the performance of a usability activity, even in a study with multiple usability practitioners involved.When more than one usability practitioner is involved the differences in interpretation and usability problem detection are viewed by usability practitioners as multiple sources of evidence therefore group work enhances confidence individual evaluation results rather than highlight an evaluator effect.

Hartson et al. (2001) provides a criteria for evaluating Usability Evaluation Methods (discussed as Usability Evaluation Activities – UEA in this thesis). These criteria provide a guide in evaluating the effectiveness of various usability activities performed to evaluate the usability of a design. The list of criteria specified by Hartson et al. (2001) have been included in Table 2-6. The ultimate goal of using these criteria to evaluate UEAs is to determine the best UEAs.

UEA Evaluation Criteria	Description
Reliability	The consistency of the results produced by the UEA, regardless of the individual performing the usability evaluation.
Thoroughness	The results should be complete, the UEAs should allow the discovery of as many of the existing usability problems as possible.
Validity	The results need to be correct, only real problems should be found.
Effectiveness	A combination of thoroughness and validity, which can have an analogy of recall and precision. This criteria can is based on relevance.
Downstream Utility	Focus on the quality of the usability problems reported. How many reported problems resulted in re-design and/or implemented changes.
Cost Effectiveness	The effectiveness is how well does it detects or identifies real usability problems in real interaction designs. The cost perspective adds a dimension of efficiency to this criteria.

Table 2-6: Criteria for evaluating UEAs (Hartson, Andre & Williges 2001)

This criteria, shown in Table 2-6, looks to compare the effectiveness of UEAs, with key measures look at the number of usability problems detected. In order to effectively compare usability problems detected, they need to be reported in a common and consistent way (Lavery, Cockton & Atkinson 1997). Then they can be more effectively compared and matched across the UEAs being compared. Understanding the effectiveness and problems with usability activities, the impact they have on the usability outcome, can provide a better insight into the selection and performance of usability activities in a project lifecycle.

Vredenburg et al. (2002) performed a survey with over one hundred usability practitioners, identifying the most widely used usability activities and processes, key factors that lead to success and critical tradeoffs made during the performance of usability activities. They described common characteristics NOT found in practice included:

- Focusing on the total user experience
- End-to-end user involvement in the project
- Tracking of customer satisfaction

The survey results also found:

- Multidisciplinary teams improved effectiveness of usability activities throughout a process

- Usability had a higher impact when there were two or more usability practitioners involved
- A list of key usability activities was identified with perceived key benefits and weakness.
- Cost benefit tradeoffs play an important role in adoption of usability practices.

Another survey (Mao et al. 2001) of 100 usability practitioners showed cost-benefit tradeoffs is a key consideration for considering adopting usability and that usability measures are not often applied or used as discussed in the literature.

This thesis will use this broad usability activity definition:

> *Usability activities are processes, that may or may not involve stakeholders, that generate usability outcomes and are performed throughout a development process; they must consider theset of usability attributes that define usability for the system and with appropriate usability measures perform the activity to generate usability outcome data.*

2.2.3. Summary

As discussed in the taxonomy of usability evaluations (Cronholm 2004; Fitzpatrick 1999), there are various factors that can be used to help in the selection of usability activities to perform during a project lifecycle. The choice often comes down to performance of an expert only orientated activity or a participant orientated usability evaluation (Desurvire, Lawrence & Atwood 1991; Jeffries et al. 1991; Nielsen 1992). This section has examined various taxonomies for selection of usability evaluation activities that look to user involvement, type of IS maturity (none, prototype or real IS), or are based on a list of criteria or business goals. This section has also examined research that discussed expert only and participant orientated usability evaluations methods. It also looked at the validity and effectiveness of the performance and outcomes generated by usability activities.

2.3. What is a usability outcome?

There are many issues that may impact the performance of usability and the overall usability outcome. The literature covers various issues, including: user and task characteristics, technological constraints, contextual and cultural issues, software architecture, identification and

measurement of usability problems, nurturing of usability understanding, cost-benefit analysis and other success or failure criteria. An example of issues was discussion at CHI99 panel which discussed why usability fails based on lessons learnt from industry practice (Rosenbaum et al. 1999). The main ideas put forward by each panellist include:

- Usability practitioners need the skillset to be able to sell/promote usability to management and learn to think strategically.
- Keeping the focus on the understanding developed about the users and their tasks, can be forgotten during the development phases.
- Lack of top management champions to support the usability concept
- Need for organisational change
- Lack of infrastructure and tools
- Not enough effort done to create relationships across various groups within the organisation and within project teams.
- Lack of focus on user experience but more of a focus on tasks and features.
- Lack of integration of usability into project lifecycle or within project plans.
- Need for cost-benefit analysis to enable time and budget to be given to usability activities.
- Usability practitioners and team within organisation need to remain impartial (not institutionalised).

These provide a number of key usability aspects that can have an impact on the usability outcome. The following sub-sections cover key research that discusses aspects that have an impact on the usability outcome. The first sub-section looks at key characteristics that impact on usability outcomes categorised by users, tasks technology and context. The second sub-section examines the most significant research that discusses the impact on usability outcome as it relates to the involvement of stakeholders.

2.3.1. Characteristics that can impact on usability outcomes

The discussion in this section highlights various factors that need to be considered when looking at various constraints that can have an impact on usability outcomes. In order to get a good

understanding of what is usability in a given scenario we need to understand what the key characteristics are. These characteristics will have an impact on the common usability factors, which in turn will help articulate the usability attributes and impact on the usability outcome achieved. The articulation of the usability attributes is very dynamic; they may change based on the scenario, given varying range of users, range of tasks to perform,IS developed and context or environment in which it will be used.

This section will examine the various usability characteristics, described in the literature, that have been considered important by various researchers, given their specific scenario. This research will examine various characteristics that impact usability using four common usability factors, discussed insection 2.2.1, regardingthe usability definition, i.e. users, tasks,IS and context. Characteristics that fall outside of these factors will be discussed separately. There are many factors that have been put forward in the literature that may impact the usability outcomes, but very few provide solid evidence on the nature of the impact.

User Characteristics

There are many different *users*that need to be considered that can impact on the usability outcome, such as the following categories(Hackos & Redish 1998): *primary users*, *secondary users*, *user communities*, *users as buyers*, and *surrogate users*. Their competence can be examined from three perspectives: subject matter knowledge, computer skill, and experience with the web application (Nielsen 1993). Marcus (2003) describes many terms that have been used to refer to users, which include: actors, consumers, participants, people, subscribers, stakeholders, subjects, etc. There is a host of literature on the importance of understanding the users. A key stakeholder is the organisation, where the *business goals* are key factors that can impact on the usability outcome. A recent publication (Hornbæk & Frøkjær 2008) has found that consideration of the business goals in design and evaluation activities can have a positive influence on the usability outcomes.

The *loyalty* of users to a web application is an important characteristic, especially to e-commerce web applications. The basic spectrum of user loyalty to an IS is from discretionary to compulsory (Tomiuk 2005). Varying levels of *credentials*, that can range from *identified, pseudonymous*, and *anonymous*(Clarke 1999), have an effect on the users privacy and security characteristics that all has an impact on the usability outcome attainable. *Accessibility* is an important characteristic of a web application. Accessibility predominantly focuses on people with disabilities. A web application needs to consider assistive technologies, and compliance to

the Web Content Accessibility Guidelines 1.0 (Chisholm, Vanderheiden & Jacobs 1999). Many studies(Chadwick-Dias, McNulty & Tullis 2002; Nielsen 2002b) also focus on *aged* users, who often display many of the aspects of disabled users in a milder form. For example, a study of mobile phone use and how the aged are impacted (Ziefle & Bay 2005) by its usability.

The psychological aspect of users is a characteristic that plays an important role. *Motivational* factors, as discussed by Zhang et al. (1999) and Smyslova et al. (2009), can include: *Work Itself* being challenging, stimulating, interesting, meaningful, useful, creative and fun; *Achievement* with successful completion of task(s); *Responsibility* given through user control; *Advancement and Growth* through the gain in knowledge and skills; *Recognition* by others of knowledge and skill level. Motivation of user characteristics to perform tasks(Smyslova & Voiskounsky 2009) is important when evaluating user performance of tasks in improving the usability findings produced. Consideration of motivational aspects of performance is an important way in which users can gain an appreciation of the tasks, and it allows a better simulation of the environment in which a user will be interacting with the IS. A different perspective by Sutcliffe (2001) describes the concept of *attractiveness* where *motivation, arousal* and *perceived utility* are key psychological factors. *Aesthetics* of a web interface can have an impact on user acceptance, Ngo (2001) has determined that the following measures impact on aesthetics: *Balance, Equilibrium, Symmetry, Sequence, Cohesion, Unity, Proportion, Simplicity, Density, Regularity, Economy, Homogeneity,* and *Rhythm.* These characteristics have a great impact on the subject satisfaction usability attribute.

Marcus and Gould (2000) and Hofstede (2001)have researched the characteristic *culture***.** The spectrum of culture can be measured using five dimensions that include: *power-distance, collectivism vs. individualism, femininity vs. masculinity, uncertainty avoidance,* and *long vs. short-term orientation*. Alternatively, a web applications culture can be limited to a specific *locality or community*, *organisation*, *country*, and/or *global* context. Culture characteristic is important consideration for a global application's usability outcome.*Emotion* is a dimension of usability that is being researched as a characteristic that impact on usability. Some companies are using ergonomics, cognitive and emotional characteristics to guide a product's design (March 1994).

Task Characteristics

The categories of tasks that need to be performed with an IS can impact on the usability outcome achievable, Deshpande et al. (2002) proposed the following taxonomy of web applications categories: informational, interactive, transaction, workflow, collaborative work environments, online communities (market places), web portals, and web services. Transactional type web applications are commonly found in e-commerce applications (Thachenkary, Chatterjee & Katz 1997) and can be further broken down into: transaction type, domain/site type, vendor type and product type.

The *interaction style(s)* that can be implemented on a web application is constrained by the technological aspects. The interaction styles provide various levels of usability, and support different types of users, these could include (Nielsen 1993): *Batch, Question-answer, Command language, Function keys, Form fill-in, Menus, Direct manipulation, Non-command, Natural language*.

The *interfacedesign*(Fraternali 1999) characteristic of a web application can be represented by: *structure* - describes the organisation of the information space presented by a web application; *navigation* - enables moving through the information space presented by the web application; *presentation*- describes the interaction styles used to present the information and behaviour of the web application. This interface medium presents a different scenario that has a network latency constraint along with limitations of browser technology used.

The user interface when examined as action and communication medium, can be described as an *Elementary InterAction Loop* (EIAL), this interaction loop proposed by (Cronholm & Goldkuhl 2002), is shown in Figure 2-6. Goldkuhl et al. (2004), have taken this EIAL and deriving three separate communication modes, i.e. Reading, Formulation, and Navigation modes.

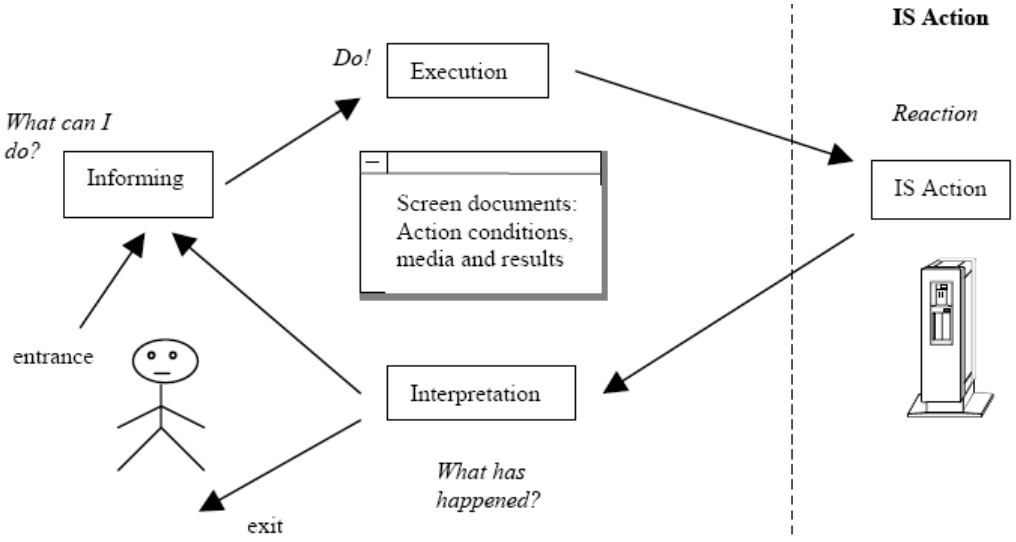

Figure 2-6: A revised Elementary InterAction Loop taken from (Cronholm & Goldkuhl 2002)

The understanding of the interaction loop phases and the different communication modes an EIAL serves can provide guidance to the usability practitioner. This guidance can aid both design and evaluations, through the articulation of an appropriate set guidelines (Cronholm & Bruno 2008).

A usability perspective is the focus on tasks. Sousa and Furtado (2005) describe the need for a focus on task by 'concretising' usability requirements through identification of usability tasks, involving users to elicit these, creation of task models and other aspects to improve the usability design process. This research has looked at improving the usability design process with a heavy focus on the task perspective of usability.

The type of task and its complexity, the interaction style used to perform the actions and the design of the interface can all have an impact on usability. Various communication models also provide a framework to understanding how a user formulates and performs a task. All these characteristics can impact on task performed with an IS and hence impact the usability outcome. There is no direct evidence in the literature that the type of task has a direct impact on the usability outcome.

Technology Characteristics

The *tools* used to implement an application can dictate the degree of usability possible, through the architecture developed with the tool. Fraternali (1999) describes these various web development tools as: *visual editors and site managers*; *hypermedia web generators*; *web*

database gateways; *web-based form editors and database web publishing wizards*; *model-driven application generators*. Microsoft PowerPoint(Microsoft.com 2011) allows publishing of its presentations by export it into HTML using a publishing wizard. This export tool limits what is achievable, such as interface design, interaction style, and aesthetics.

Development of applications can be for intranet, or Internet networks. Karlsbjerg (2003) describes implementation strategies for intranet web applications from two perspectives: first, the architecture of the web application is tailor-made or ready-made; secondly, it is implemented or configured in-house or outsourced. This *ownership* characteristic of the application, impacts on the ease by which the web application can dynamically meet the needs of the website owner and its visitors in web time. Web time (Cloyd 2001) is a term that refers to the tighter development timelines for web applications.

Web environment provides various characteristics that have an impact on the usability of a web application. Lee (1999) describes *system variables* as a characteristic of web application that include visual display device capabilities (resolution and colour), input devices limitations, and internet transmission speeds. The various devices being used to access web applications requires additional consideration focus on usability, for example a small screen device (such as a PDA or Mobile Phone) accessing a web application has scrolling issues, in comparison to a desktop computer. *Internet latency* affects web usability, Marshak and Levy (2003) examine various aspects that may improve the latency: a mirror site, wider connectivity to the Internet, better Web server or load balancing. *Visualisation* of the interface to a web application maybe be examined by adapting Price, Small & Baecker's (1993) taxonomy of software visualizations that include: *Scope, Content, Form, Method, Interaction, and Effectiveness*.

The technological characteristics have a greater effect on web application usability than in traditional applications; web application architecture can be more distributed and reliant on a more diverse set of technologies. Ownership and system variables require additional consideration when determining web application usability because of the diversity of devices that are now web enabled.

Context Characteristics

An industry classification provides the context of the environment where the users perform the interaction. Traditional application domains and industry classifications have been explored and

summarised by Glass & Vessey (1995). An *industry* classification is a characteristic of a web application that highlights special needs of an industry in relation to usability. For example, finance industry requires greater focus on security, while government web applications need greater focus on accessibility. There is a major industry classification prescribed by the Australian Bureau of Statistics (McLennan 1997), that includes: *Agriculture, Forestry and Fishing; Mining; Manufacturing; Electricity, Gas and Water Supply; Construction; Wholesale Trade; Retail Trade; Accommodation, Cafes and Restaurants; Transport and Storage; Communication Services; Finance and Insurance; Property and Business Services; Government Administration and Defence; Education; Health and Community Services; Cultural and Recreational Services; Personal and Other Services.*

The *contextual* properties (Finkelstein et al. 2002) of a user that is interacting with a web application can vary with each web application. *User* context allows identification and enables personalisation. *Network* provides network and bandwidth context. *Location* captures information about the location that can enhance context of web application. *Time* context represented at a web server may dictate opening and closing times or relate to a timetable or schedule. Fabre et al. (2001) examine these contextual issues coining a term Temporal Aspects of Usability (TAU), which included four elements: Duration, Location, Frequency and Contingency. This definition provides a more comprehensive discussion of contextual issues. Duration examines the length of time an activity will take. Location highlights the when and where the activity will take place. Frequency describes how often an activity occurs. Contingency provides focus on what activities depend on this activity and vice-versa.

Finkelstein et al. (2002) states that because 'web application suffering from the anytime/anywhere/anymedia syndrome', that the focus on *customisation* can tackle these contextual issues. Many authors examine customisation from various perspectives, Kappel et al. (2000) describes it as adaptation (static or dynamic) and context (static or dynamic).

Contextual properties, customisation and industry classification provide the characteristics of web application that enable the environment to be tailored to the stakeholders, their tasks and the technology to support the interaction. These contextual characteristics will enable a better focus on usability attributes.

Many usability practitioners and researchers in the usability area have discussed the importance of usability for a given context. The health care industry is one such context, where it is paramount to remove any use errors and/or usability issues. Bligård and Osvalder (2007) have

described the importance with medical equipment: the possibility of it causing injury to the patients through a user making a mistake that results in injury, the user becomes stressed and anxious diminishing the user's capacity for giving the patient care, and the user's inability to use the technology reduces its effectiveness in treating a patient.

Perceptions of usability can differ between *cultures*. Usability activities are being used across cultures and are presumed to be culturally universal (Irani 2010), but they are not. Irani (2010) looked to understand impacts of intercultural collaboration in relation to power dynamics, histories of colonialism, and generative models of culture. Smith et al. (2007) also highlighted the impact of cultural and organisational differences across countries impacting the selection and the required performance flexibility of usability activities in localising them to improve their effectiveness in industry practice. Other research has highlighted the importance of more research into the impact of cultural differences affecting predominantly Westernusability activities. 'Our findings suggest that perceived usability, for instance as measured in satisfaction questionnaires, is affected by the cultural background of participants. Caution is also needed in interpreting the results of cross-cultural usability tests. We argue that usability research needs to look more into cultural background as a moderator of preferences and of the relation between usability aspects and preferences' (Frandsen-Thorlacius et al. 2009).

A review of journal publication about culture and usability (Clemmensen, Torkil & Roese 2009) has revealed Hofstede's (2001) cultural dimensions as the dominant model of culture and that all the studies in the literature have used quantitative methods. Hofstede's(2001) cultural dimensions include power distance, individualism, uncertainty avoidance, masculinity, and long-term orientation. These have been used to compare various web applications (Marcus & Gould 2000) and have been shown to explain difference found across cultures. Research studies of both culture and usability havepredominantly been discussed by English speaking researchers. In order to better understand this area and how it affects the usability practitioners working within it, further study needs to be done (i.e. more qualitative studies) to gain a richer understanding of the issues that need to be considered from a usability perspective from cultural differences.

The practice of usability within other cultures requires understanding of those usability activities and flexibility in order better decide which usability activities will be most effective (Smith et al. 2007). This requires a broader education of usability rather than just teaching the process of performing the usability activity. This also requires understanding of the cultural and organisational differences in other countries in order to be able to localise the usability activities for that country.

2.3.2. Stakeholderinvolvement

This section will examine the various stakeholders that could collaborate on a project where usability maybe involved. It will examine some of the literature that has discussed various aspects of these different stakeholders and their involvement. This will highlight the importance of involvement to improve usability outcomes for a project. The various roles of stakeholders discussed include:

- User's of the system
- Senior management
- IT project team members, such as the developers, business analysts and project managers
- Usability practitioners

The importance of senior management stakeholder involvement in projects is discussed in the literature. It is important to educate the senior managers within an organisation in the value and importance of usability within a project lifecycle and within an organisation (Zhang 2006). Their sensitivity to the concept of usability can not only enable high-level support for usability initiatives, but also improve usability maturity across the organisation. Bloomer and Wolfe ran a tutorial (Bloomer & Wolfe 1999) on strategies for integrating usability into an organisation by communicating its value at multiple levels in the organisation. Convincing management, understanding how to speak the various languages of the various stakeholders and accumulating usability data to help convince stakeholders are key aspects to consider. This discussion was predominantly about getting senior management involvement, butanother discussion (Bloomer, Croft & Kieboom 1997) focussed on the need to considerIS project team stakeholders. The following tutorial (Bloomer, Croft & Wolfe 1998) discussion focused on convincing stakeholders on the value of usability across the organisation. All these papers look to improving the value of usability to stakeholders across an organisation. Strategies used to convince stakeholders were communication (using different languages, for example business or IT) and involvement at all levels across all stakeholders in an organisation.

A study (Cajander, Gulliksen & Boivie 2006; Eriksson, Gulliksen & Cajander 2008) on the management perspective of usability, highlighted managements' instrumental view of processes with a focus on efficiency and cost, along with the tendency to underestimate the complexities involved in the business problem being tackled, and the objectivity and control that managers

require. The study suggests the following to overcome these issues: improve usability understanding, create understanding of what is necessary for real users, look to involve, need a senior management usability champion, improve understanding of the complexities of the work, and communicate the value at a management level. These suggested issues are similar to those covered in other parts of the usability literature for other stakeholders, especially in the *introduction of usability* to organisations literature.

A set of discussions, moderated by Rosenbaum et al. (2002), providing fourstories, by experienced usability practitioners, about their experience fitting usability activities into anorganisation's development lifecycle. The key lessons learnt were the support needed from the organisation from senior management support, individual developers and mid-management, and the involvement of stakeholders, developers and managers in usability activities. There was also a need to educate project stakeholders about the usability concept, especially new employees. During performance of usability activities, there needs to be flexibility in the performance to consider the context of use and the various project constraints.

The involvement of many stakeholders groups in an IS project can have varying implications in the success or failure of an IS project(Hekkala, Iivari & Halonen 2008). It was found that any collaboration between stakeholders is always challenging within a IS project, with fostering the relationships between stakeholders and open communication being key requirements.

The success and failure of IS projects is commonly discussed in the literature. This research describes many factors that may influence the success or failure of an IS. Predominately this focuses on the importance of involvement across all project stakeholders which include end-users, developers senior managers and skilled IS team members (Kappelman, McKeeman & Zhang 2007; Karlsen et al. 2006; Linberg 1999; Reel 1999; Standing et al. 2006). This provides a link to the IS success and failure literature which highlights how involvement can have a significant impact on the project outcomes.

User involvement allows information about users to be collected, with users actively involved in the requirement gathering, construction and/or deployment phases of a project. The involvement of project stakeholders, especially the primary user of an IS, has a positive influence on usability outcomes for a project. This involvement has been discussed in the literature for many years (Allen et al. 1993; Borgholm & Madsen 1999; Grudin 1991; Maguire 2001). The primary user must be involved or represented throughout a project lifecycle (Carter 2007; Følstad 2005; Følstad, Jørgensen & Krogstie 2004; Gulliksen et al. 2004; Maguire 2001). The involvement of

project stakeholders in project activities provides an opportunity to elicit data that can be a more effective source for capturing project requirements (Kujala 2003). This involvement is something usability practitioners attempt to obtain when engaged in a project (Robertson, T & Hewlett 2004). Involvement has been discussed and researched from many perspectives, including:

- Involvement must be strived for in every project?
- When should they be involved?
- When should they be not involved?
- When during a project lifecycle should they be involved?
- What if users are unavailable to be involved?
- Who should be involved?

A comprehensive discussion of the user's role in participating and supporting involvement in a project lifecycle is presented by Damodaran (1996). The basic issues around user involvement include the context of involvement, the benefits of involvement (i.e. improved quality, avoid unwanted features, improve acceptance of system, greater understanding of system, and increase participation in decision-making), consideration of pitfalls (no communication lines with users and providing training which changes the user views to match designer), and infrastructure requirements. Making user representation work requires consideration of the following elements to gaining participation such as: selection, support from other users (i.e. managers) and training. The roles users play in a project lifecycle include: users as owners, diversity of user community applying their goals and constraints, user expertise pools and top management support (promoting positive attitude to IT, start and support user involvement, empowering users to provide their expertise, goals and constraints), middle management (promoting consultation and support user analysis) and user representative (need to be able to engage in the project). In summary, responsibilities of a user representative include providing detailed knowledge, highlighting strategic issues, managing the user role and participating in quality assurance. This (Damodaran 1996) research highlights the complexity involved when considering the involvement of project stakeholder in a project lifecycle.

The usability practitioner's role of attaining user involvement can be constrained. Wilson (1997) describes contacting and selecting users, motivating users, facilitating and mediating meetings and offering various ways for user to contribute as aspects that can be an obstacle or can

facilitate user involvement. This research also highlights the difficulty in balancing conflicting demands discovered through the user involvement.

The success and failure of projects is often attributed to issues around stakeholder's involvement. Often this involvement is limited to the users, and does not include project sponsors, management and all members of a project team (Barki & Hartwick 1989). Swanson (1974) describes the importance of the level of involvement, in order for user to get an appreciation for what the IS will offer. Begier (2007) suggested that the level of satisfaction attained, with the IS developed for the stakeholders, improves through involvement.

The type of involvement by which stakeholders participate in a project lifecycle can also impact on the success or failure of a project. Barki and Hartwick (1989) argues that there is a clear difference between 'user participation' and 'user involvement'. This argument relates primarily to users of the IS being developed. It provides a clearly different level of commitment and involvement by the stakeholder. User participation is 'defined and measured as a set of operations or activities such individuals have or have not performed'(Barki & Hartwick 1989). User involvement where involvement is seen as a 'subjective psychological state' (Barki & Hartwick 1989), goes beyond user participation, where personal relevance is placed on the IS being developed and the user's focus of importance is to be involved in the development process. The involved user considers the IS being developed to be both important and personally relevant to the goals they are trying to achieve in their capacity within the organisation. This looks to improving the benefits gained by involvement from simple participation to a deeper involvement with the development process that mean user attitude are more strongly related to the involvement.

Ives and Olson (1984) describe involvement by type of participation and degree of participation. The type of participation can vary from indirect (where users' representatives participate in the project) to direct (full participations by the users themselves). The degree of participation relates to the amount of influence the user actually has on the design of the IS, which can range from no influence to having strong control. Franz and Robey (1986) also described involvement as the users influence on and during a project. This study has sampled 118 user managers in 34 countries that highlighted the relationship between user involvement and system usefulness and organisational factors that had an impact on this relationship. The study looked to examine the influences on the performance of activities in particular aspects of the IS. They detailed four core areas of such influence:

- Explaining and clarifying information needs
- Detailing input and output requirements
- Stating system needs and objectives, and
- Asking questions and providing answers.

These activities could occur at different stages in a project's lifecycle, but predominantly in the analysis, design and implementation stages. The results showed that involvement was a function of the organisational context and the perceived usefulness was a function of involvement and organisational context. The result offers modest support for the idea that user involvement increases the usefulness of an IS. Involvement and usefulness also correlated well because it helped increase a person'sunderstanding of how the system will perform (Franz & Robey 1986). The other findings were that user involvement during the less structured design phase of a project lifecycle was very important. This is not to say this is the only time to get user involvement, early stage involvement and later stages of a project lifecycle still considered important.

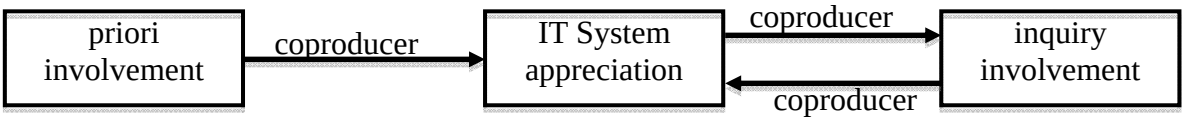

Figure 2-7: Swanson's(1974) involvement stages

Swanson (1971, 1974) discusses the involvement and appreciation levels and their impact on the acceptance by managers of an MIS. This work concludes that involvement must include additional 'co-producers' that will supervise and oversee the involvement to improve/maximise the outcome of the involvement. It discusses the various forms of involvement that occurs.

- *Cooperatively involvement* with an IS, where the attainment of the ends for each are reached. Both the IS and the user that will use it are involved with each other to perform and attain the same goals.
- *Inquiry involvement* is looking at 'purposeful activity' with the IS. This is the actual use of the system by the user that it's aimed at.
- *Priori involvement*in the design, implementation and operational stages. This is where the user who will use it is also involved through the development of the IS.

- *Appreciation involvement* requires a belief in the IS and its relative value. The user sees the value of the IS and will use to attain their goals and achieve inquiry involvement.

The IS team members (referred to as the 'techno-proponent' group) facilitate the involvement to enable the gaining of appreciation and the improved inquiry involvement. This team develops and designs theIS, they identify the users to involve, provide features to encourage use and encourage involvement in training. Increasing the priori involvement enables the IS team to improve inquiry involvement. Therefore, IS team motivates project stakeholders by selling the concept and raising awareness. The aim is to gain 'appreciation' to improve utilisation and to seed the value in theIS. This study requires involvement to enable project stakeholders an appreciation of an MIS and seek to sell its value to an organisation in order to improve utilisation and support of a key management activity.

Three conjectures are derived from the model. First, an increase in the a priori involvement of an individual with an MIS will increase his MIS appreciation. Second, an increase in the MIS appreciation of an individual will increase his inquiry involvement, and vice versa. Finally, an increase in the a priori involvement of an individual with an MIS will increase his inquiry involvement.

This same model can be applied to other IS. If this phenomenon is based on involvement to improve usage and appreciation of an MIS, a parallel can be drawn with usage and appreciation of any IS. This model provides an interesting set of variations in involvement that would also improve the usability of an IS. If appreciation and inquiry involvement is achieved it can be concluded that the IS has met the needs of the users that it has been built for.

Another approach to increasing the value placed on involvement, within an organisation, is the setting up of a 'design collaboratorium'(Bødker & Buur 2002; Buur & Bødker 2000), i.e. a space/laboratory, for the performance of usability activities, is promoted as a way of providing a space where stakeholders can come together, actively participate and be involved throughout a project. This sort of environment can increase and improve involvement by project stakeholders, may provide additional credibility for usability practitioners, but is not commonly discussed in usability literature in relation to successful usability outcomes.

An innovative usability activity discussed by Seland (2006) is the value in performing a Role-Play usability activity to enhance the design process. Seland's study shows that role play is perceived as useful to making end users more active participants in the project, creates a focus on user needs, fast idea creation is done early in project, and it enhances developers' understanding.

This innovative usability activity provides an example of usability literature looking to promote more methods that can enhance and promote project stakeholder involvement.

A novel approach to gain involvement by project stakeholders is ‘A Game Show’ approach (Twidale & Marty 2005). This approach allows for an audience to be involved in an observational capacity, talking on various roles in a usability test environment, providing anopportunity to learn about usability, see benefits of performing usability activities and experiencing the frustrations that users have performing tasks with given aIS. This literature (Twidale & Marty 2005) and other literature (Wixon 2003) discuss participation through observation by project team members,such as developer, business analyst, project manager and management.

Heuristic evaluation (Nielsen 1993) is a widely used, but less effective,(Gulliksen et al. 2004)usability activity that involvesrepresentative users who are the project stakeholders. There is an interesting variation to the heuristic evaluation, discussed by Muller et al. (1998), which looks to involve both IS project team members and subject matter experts (users) as usability inspectors in a participatory heuristic evaluation.

There are various methodologies that promote the user involvement to some degree through the project lifecycle, e.g. Rapid Application Development (RAD). MacKay et al. (2000) describes the RAD development methodology as being explicitly about enrolling users, which leads to a better understanding of users, often becoming advocates for both the process and the IS. MacKay et al. (2000) go further by suggesting that RAD success is as much about building social-technical networks that include both the IS and the user. This is not a one-way street, the designer configures the user, but the designers are also configured by the organisation and by the users. MacKay et al. (2000) highlighted that bringing together users and organisational stakeholders, with the IS is a key aspect to the success of a project.

Involving users can improve their understanding and contribution to the project. Cronholm and Goldkuhl (2006) have recognised this through their document driven approach. This approach uses two principles: ‘connecting to what is known’ and ‘shifting between abstractions and concretions’. The use of existing familiar documents gives a starting point, while converting this to concrete involves users in the development process. Their case study showed that this improved conditions for communication between project stakeholders, improving conceptual understanding, leading to process improvements.

An examination of the literature about involvement provides various dimensions of factors that may impact or define involvement of project stakeholders. Table 2-7 highlights these dimension, describing the type of involvement, from appreciation where the value of a system is gained, to indirect involvement where usability practitioner become advocates, to participation in usability activities, to involvement in the methodology that is building the IS, and finally active and effective usage of the IS (inquiry).

Involvement Factor	**Sub-factors of the involvement**
Type of engagement	Appreciation, Indirect, Participation (direct), Involvement, Inquiry
Degree of influence	None, Usability findings, Usability value, Project constraints, Usability goals
Domain of expertise	Business context, Technology, Project lifecycle
User community	Primary user, Project IS members, Organisational stakeholders Usability practitioners
When engaged	Conceptual, Start, Middle, End, Throughout (end-to-end)

Table 2-7: Stakeholder Engagement factors and sub-factors.

In conclusion, the literature sees that a key to project success is achieving involvement within a project and across an organisation as an overall mindset in the development of anIS. Iivari (2004) discuss this as ‘enculturation of user involvement’, looks to understanding the context of the organisation in order to initiate enculturation of user involvement and different approaches to achieve it. This highlights the importance of both the activity of user involvement and the importance of changing the organisational culture to embrace user involvement.

2.4. Usability Practitioner

The literature does describe various aspects to the role of a usability practitioner. This section will look to examine what has been discussed in relation to usability practitioner credibility, skillset required by usability practitioners, looking at ways to improve the value in engaging a usability practitioner, support needed by usability practitioners, the role of representing users and future trends for usability practitioners.

Usability practitioners have been given many titles in industry practice. But there is some research, by Iivari (2005), that discusses usability specialists as a community of practice. In this study usability practitioners are categorised into three communities of practice:

1. 'A controlling mommy mob' – looks to do the broader level work and controlling usability resources. This group looks to strong management support for usability and manages the relationship with developers and other stakeholder groups that may impact on the performance of usability.
2. 'Realistic humanists working with engineers' - using stealth to cooperate with IS project team members and participate in strategic decision making from a usability perspective. Look to cooperate with developers on the interface and interaction style. Maybe hindered by developers due to lack of usability understanding.
3. 'Staid researchers' – performs usability in isolation in projects and may participate in strategic level planning and quality improvements. Maybe hindered by other IS projects team members and lack of usability understanding.

This provides an interesting breakup of usability practitioners that looks to describe scenarios or situations that usability practitioners find they are working in. The possibilities within an organisation in being able to perform usability activities and the resources provided can impact on the amount of usability possible. The usability maturity of an organisation may also dictate the approaching or community of practice that needs to be used. These communities of practice touch on issues with the level of collaboration between groups in an organisation, usability understanding or lack of it, management of resources and relationship across project stakeholders. It also alludes to a set of skills required within each community of practice in order to be successful.

Other research by Iivari (2006) discusses various usability practitioner roles within an engagement in a project. This looks at the predominant activities performed by usability practitioners when engaged to perform usability. These include:

- Informative role – usability practitioners are a provider of information, more specifically they provide user data and usability findings from performance of usability activities. Usability practitioners also look to provide information about best usability practice in relation to selection of usability activities to be performed.

- Consultative role – usability practitioners are often asked to comment on design solutions using their usability expertise and knowledge of the business context. In this role they often are engaged late in a project that reduces the potential affect on the usability outcome.
- Participative role – where a usability practitioner becomes part of the IS project team, has usability credibility within the project, which allows a usability practitioner to participate in the decision making especially in relation to usability activities performed during the project lifecycle.
- Configurer role – this is where project stakeholders, especially IS project team members, have the skillset to configure the user for the project, similar to being an evangelist.

This section will examine various issues related to usability practitioners that have emerged from the literature. These include various roles and tasks performed: liaison, change agent, evangelist, user advocate, trainer, mentor, consultant, and expert.

The role of a usability practitioner over time is continuously changing (Wilson, CE 2005). As the usability practitioner becomes more involved in projects and with organisations, and the usability maturity improves across the industry, it is inevitable that the role will change. As discussed at the start of this section, there are various communities of practice (Iivari 2005) for usability practitioners, which highlight the changing role of usability practitioners. This also highlights the changing role of a usability practitioner.

A study of twenty six information architects (Robertson, T 2004; Robertson, T & Hewlett 2004), with three to nine year's experience in Australia, looked to examine the impact that they have on involvement in IS projects. The interviews were open-ended questions about the work of information architects have been performing in industry practice, i.e. 'what is your role in a project?' The study examined the role of 'information architects' in a project, working within the usability conceptual area.It was highlighted that the traditional work done by information architects was not the only thing that occupied their work practice. The generic role of a usability practitioner was reported in the study:

- Communication facilitator in a project, coordinating their work with the work of other IS project team members, eg. negotiating access to users, liaising with content providers, liaising with external providers, preparing and delivering presentations and customer pitches as well as the range of activities.

- Fluidity required in practices, which always were aimed towards filling the gaps between process models and specific actual processes
- Establishing relations between, and holding together, whatever processes they found themselves part of and whatever products they were designing.
- Coordination work where the politics played out and where any usability gains are won and lost.
- Non manager IA found it hard to get or have communication with senior managers.
- Financial and political constraints impacted on work.
- Requirement to represent the users during the development process
- Impact of or acceptance of usability findings varied among the IS project team members.

This discusses the role of a usability practitioner along with the various aspects of performing this role that can have an impact on the usability outcome achieved. Communication and fostering of relationships with other project stakeholders, such as senior management and other IS project team members, are important activities required of usability practitioners.

The usability practitioner's role is constantly changing, various factors can dictate the role required of the usability practitioner within a project lifecycle or an organisational context. The usability maturity of the stakeholders involved or the organisation engaged by, the usability goals, when engaged, and the project and organisational constraints can all impact on the roles usability needs to play.

2.4.1. Usability Adoption

One of the roles of a usability practitioner is to improve the adoption of usability by the project stakeholder and organisation. To improve adoption a usability practitioner may use various techniques. Predominantly usability adoption requires understanding the value of usability.

The literature discusses the importance of improving usability understanding (Robertson, T & Hewlett 2004; Seffah, Desmarais & Metzker 2005) and to improve the ability of usability practitioner in a project lifecycle to increase usability maturity. There are various mechanisms to promote and improve usability and usability understanding. The literature provides various studies that describe usability maturity models providing measure of usability readiness for

organisation which is discussed in section 2.5.4. This section will focus on the psychological principles, evangelistic approaches, successful adoption criteria and obstacles to adoption discussed in the literature. This section aims to provide an understanding of the various literatures that promotes usability from these perspectives. The level of adoption has a significant impact on the usability outcome achievable.

Evangelising Usability

The word ‘evangelism’ is defined as ‘the preaching or promulgation of the gospel; the work of an evangelist’ (Dictionary.com 2011b). A usability practitioner is often in a situation of selling or preaching the value of usability and related usability activities to project stakeholders, in order for them to be considered or taken seriously within a project.

The evangelising of usability is a more proactive approach to building usability understanding with project stakeholders. The main aim is to at least provide an understanding of usability value. Nielsen (2005) describe two types of evangelism, early and late evangelism. Early evangelism is describing the establishment of a usability group within an organisation. ‘The key word for early evangelism is to be opportunistic in allocating your scarce resources. You can’t follow the recommended usability process in all its glory because your organisation lacks the commitment required. Easy usability wins may generate business wins for company’ (Nielsen 2005). This describes an early stage of evangelism where a usability champion is trying to gain a foothold within an organisation.

Late evangelism is the establishment of a usability culture throughout the organisation’s processes. The goal of late evangelism is to fully integrate usability into the development process. All managers should understand the basic concepts of usability. There needs to be an increase in usability maturity, with the organisation adopting a usability culture (Nielsen 2005). In order to gain the maximum benefits from the performance of usability activities, they need to be woven into the fabric of the processes throughout the organisation, and need to be supported and promoted by all the stakeholders, from the managers, and development teams to the users.

Dayton (1993) describes the various skills that a usability practitioner needs to perform usability activities and promote the usability concept. This literature discussed ‘Selling & convincing’ of ideas to the project stakeholders, not simply presenting them, but making a convincing presentation giving the usability concept(s) or usability activity(ies) every chance to be adopted.

It also describes ‘Evangelism’ of usability activities and service provided by usability practitioners as needing to be ‘sold aggressively’ to project stakeholders. This research highlights skills required by usability practitioners that require them, as part of their role, to promote usability.

There are other parts of the literature that describe the requirement of evangelising usability, in order to introduce, promote or improve usability understanding. Levi (2007) discusses the change in organisational culture that usability practitioners need to make with project stakeholders (IS project team members and senior managers) from the bottom up and top-down in relation to evangelising usability to them. Bloomer and Croft (1997) discuss the importance of evangelising usability when looking to ‘pitch usability to your organisation’. These evangelistic dimensions are focused on a general promotion of usability value and/or usability understanding.

Evangelising usability through performance of usability activities is another approach. Bernhaupt and Weiss (2007) discusses using ‘evangelization-shock’ method to convince project stakeholders to consider the results of usability evaluation, by showing them video or allowing them to observe test participants which are having difficulty with the design. Another method was employing users that will perform badly during usability testing, as early as possible in a project, to evangelise usability (uidesign.net 2000). This may seem unethical but it shows the desperate lengths that usability practitioners will go to in a low maturity organisation and/or project to evangelise usability.

The literature looks to evangelism as a required role and skill that usability practitioners perform (Dayton 1993), as a way to convince project stakeholders of the value of usability during usability activities (Bernhaupt & Weiss 2007; uidesign.net 2000), as something done to introduce usability (Levi et al. 2007) where usability maturity is low (early evangelism (Nielsen 2005)) and needs continual focus/adherence to entrench usability as part of the organisational mindset (late evangelism (Nielsen 2005)). A usability champion is needed during early stages of a low usability maturity organisation (Nielsen 2005) to help evangelise usability and improve usability maturity.

A set of discussions, moderated by Rosenbaum (2002), providing four stories, by experienced usability practitioners, about their experience fitting usability activities into organisation’s development lifecycle. The key lessons were the support needed from the organisation from senior management support, individual developers and mid-management, the importance of being ‘innovative’ in the use of usability activities and iterating, and the involvement of

stakeholders, developers and managers, in usability activities. The discussion reinforced the importance of selling the usability message to all part of the organisation as a key to usability adoption.

This discussion on usability evangelism seems to imply the evangelism levels which impact on usability maturity, which initially is the value of usability needs to be promoted (a usability champion is needed to aide this activity). This can lead to evangelising of usability activities that can be integrated into a development process. Ultimately evangelising can lead to enculturate usability in the organisational culture where it impacts on decision making.

Psychological principles

The work performed by usability practitioners is often not valued with an IS project team. They are not taken seriously and are not given a seat at the IS project team table (Rosenbaum et al. 1999; Sherman 2006; Wilson, CE 2007). Wilson (2007) describes various principles from social psychology that can help a usability practitioner's persuasive repertoire:

- The norm of reciprocity – you do me a favour, and I'll do you a favour.
- The foot-in-the-door principle – starting off with small initial requests, will increase likelihood of acceptance of larger requests.
- The liking principle – the more people like you (and you like them), the more persuasive you will be.
- The 'mere exposure' principle – the more exposure to a stimulus, the more people like that stimuli (persuaded by repeated exposure).

These persuasive techniques can aid a usability practitioner in making usability gains within an organisation that has a low usability maturity level. They can also aide in continual promotion of usability at a project level and at a usability activity level. These psychological persuasion techniques are tools that can be used to promote other concepts, which highlights how these can be coupled with the diffusion of innovation theory (Rogers 1995), as tools that can be used by change agents and innovators.

Important characteristics that can impact the usability of an IS are the psychological factors of the primary users. This may include the development of a long-term (Bickmore & Picard 2005) relationship between the primary users and the IS that may impact productivity, enjoyment,

engagement, motivation and other psychological factors. The characteristics of aesthetics (Ngo 2001) and beauty (Norman 2004; Overbeeke et al. 2002) provide important elements to improving the relationship with primary users and usability of an IS. Other research by Leonard and Riemenschneider (2008)provides some interesting psychological characteristics that include temporal dissociation (inability to register the passage of time), focus immersion (other attention demands are ignored), enjoyment and perceived control have an influence on interface designs. It is important to consider the psychological characteristics that can have an impact on acceptance of an IS.

Usability adoption success criteria

The usability literature has various discussions on the various aspects that need to be improved or focused on to improve usability outcomes. Three specific pieces of literature have directed their research to the success in usability adoption. These include:

- Billingsley (1995) identifying five critical success factors for long term success of usability within an organisation. The 'Preliminary strategic planning' factor is discussed in detail, looking to provide an opportunity to involve various stakeholders and create priorities and concerns to insure support of usability, create an organisation vision for usability, look at a large usability engagement.
- Aucella (1997)described five key strategies that, if followed, will ensure the success of usability for a project. These success factors have been inspired by the success and failure to introduce usability in many organisations and the lack of influence usability activities performance attempts have had within projects.
- Editor Paul Sherman (2006) provides various stories, from a variety of authors, on usability success stories. The various factors presented are summarised as success factors by Sherman that are based on the usability success stories. The change agent factor is discussed in detail looking to the change agent (usability practitioner) to reach across discipline boundaries, identify like-minded change agents and build relationships to foster collaboration, persistent in the advocacy of a data-driven approach to design, possess the ability to patiently work around resistance and organisational obstacles, demonstrate in both words and actions a passionate belief that technology should serve users and not the other way around, have a strong grounding in business and technology

and have empathy for others who do not (yet) share their vision and passion about usability. Changing Organisational culture is another important factor is that is slow to change, Sherman discusses that with stakeholder advocates and influence, key high-level management, dedicated individuals from the majority of the project stakeholders groups, it can move the organisation to a desired future state of improved usability maturity.

(Billingsley 1995)	(Aucella 1997)	(Sherman 2006)
Preliminary strategic plan		Changing organisational culture
High-level champion		Usability champions
An experienced usability practitioner to lead usability effort	Work with a seasoned usability expert, especially at the beginning of the process	Usability practitioner as a change agent
Selection and sequencing of usability activities	Establish best practices using templates for plans, tools, reports, and other projects	Improves usability understanding allowing for better traction with performance of usability activities
Developer involvement	Promote project team buy-in to usability	Consideration of user does not discount consideration for business and technologist
	Plan and budget for usability resources	
	Document usability findings and make the information available electronically	
		Usability takes hold in margins, small gains improve usability value

Table 2-8: Comparison with critical usability success factors from three research studies

No direct consensus or clear set of success factors from the three literature sources. The various success factors touched on many of the concepts that have emerged in this thesis. The key areas of agreement are: involvement and buy-in from project stakeholders, one set of success factors focuses on involvement of developers, another on promoting usability with project team and the other looks to involve more than just users to include organisational stakeholders and the IS project team members.

Selecting, sequencing, gaining traction for and establishment of best practice in relation to usability activities are where these studies have commonality. Two of the studies look to a

usability champion to help promote the value of usability to project stakeholders, and all three of the studies look to involve an experienced usability practitioner that would look to improve the adoption of usability within the organisation. The last of the common success factors is the strategic usability that looks to develop a strategic plan or change an organisations culture in relation to usability.

Obstacles to usability adoption

Rosenbaum et al. (2000) conducted a survey at CHI99 and UPA99, collecting 111 responses.Respondents were asked to identify the top two obstacles that impacted on strategic usability within their organisation. The result of this question, shown in Table 2-9, highlights the requirement of usability nurturing to reduce resistance, improve lack of understanding, and increase the value placed on usability findings.

Categories	Descriptions	Freq. Cited
Resource Constraints	'perceive usability as taking more time in schedule' 'time to market is tight' or 'too fast turnaround between revs' 'schedule limitations' 'lack of budget – no money to hire usability, need money to act' 'too much to do & too few employees to handle projects'	28.6%
Resistance to User-Centered Design/Usability	'resistance among engineers and/or management to usability' 'no see the value of usability/HCI' 'lack of management interest/respect/support' 'organisational inertia – we've always done things this way' 'engineers believe they already know and understand HCI/usability – they have (HCI/Usability) skills'	26%
Lack of Understanding / Knowledge about what usability is	'need education' 'seen as only testing activity' 'role of HCI not specifically known'	17.3%
Better Ways to Communicate Impact of Work and Results	'need cost-benefit analysis – unable to prove link to what happens in the market/with the user from our recommendations' 'visibility of impact of results' 'need to differentiate (usability) from systems development – what's our value-add' 'credibility of our impact'	13.3%
Lack of Trained Usability / HCI Engineers	'can't find people with the technical expertise' 'lack of experience in the field/corporate practice of usability/HCI'	6.1%
Lack of Early Involvement	'need more partnerships with marketing earlier in the cycle' 'strategic usability overlaps with marketing's role – we need to coordinate with them more'	5.1%

	'we're brought in too late to have real impact' 'impact in limited due to mostly usability testing input later (in cycle)'	
No Economic Need – Customers Not Asking for Usability	'no customers asking for greater usability – products are successful in the marketplace without it' 'no negative market consequences identified for not including usability in our process/consequences for not including usability don't exist'	3.6%

Table 2-9: Usability Practitioner survey, conducted at CHI99 and UPA99 (Rosenbaum, Rohn & Humburg 2000)

The various categories (Table 2-9) highlight the need for usability evangelism, need for usability education and a need for improved usability maturity. These have an impact on strategic usability that is defined as 'embedding usability engineering in the organizational processes, culture, and product roadmaps. In strategic usability, usability data contributes to corporate-wide decision-making, such as product priorities and make vs. buy decisions'(Rosenbaum, Rohn & Humburg 2000). This definition refers to a usability mindset that is beyond a project usability vision, which requires nurturing of usability understanding.

Rosenbaum (2000) describes various obstacles to strategic usability and elements that improve strategic usability see Table 2-9. The concluding remarks discussed how the size of the company, methodological and organisational approach were equally effective. What really mattered most was the working at fostering involvement across the project stakeholders. In addition, having first hand observation and even participation in usability activities is important. Along with visibility and support of project sponsors (management) are key elements to successful strategic usability. The education of stakeholders to gain usability understanding needs to be considered for ongoing credibility of usability. Performing usability activities that allow for stakeholder involvement is a good way to facilitate usability understanding and credibility. A usability activity, such as a heuristic evaluation, is a very popular performed activity (that does not allow for stakeholder involvement), rated very low in its effective in strategic usability.

A recent (Mao et al. 2005) survey discusses the uneven adoption of usability across the industry, but the impact of usability activities on projects is improving with significant increase in usability and wider use being projected in the future. It found field studies (real life participants) were ranked highest, but the heuristic evaluations (expert only i.e. usability practitioner) were still heavily used. The study did highlight the need to find a new perspective for usability practice that focuses on end-to-end lifecycle involvement and improved usability measures.

In order for usability to be adopted with project teams and across organisation, a level of usability understanding and maturity needs to be attained. Consideration of the various obstacles discussed in the research presented can help improve the adoption attainable by usability practitioners.

2.4.2. Credibility of usability practitioners

The fact that usability practitioners often lack credibility within a project or organisation is discussed in various survey studies and literature. Often when integrating usability into an organisation credibility needs to be attained (Fellenz 1997). When introducing usability, Mayhew (1999) discusses that usability credibility needs to be established first, then the tactical usability can be fully implemented within the organisation and finally the strategic usability can be focused on and institutionalised.

A survey performed by Gulliksen et al. (2004) examined the issues that lead to 'poor usability'. They surveyed usability professionals in Sweden in 2003. It covered a gambit of issues including: software development process, usability methods, user involvement, and organisation matters. The key findings include a 'lack of respect and support for the usability issues and the professionals working with it'. This included management and project management support and very low stakeholder involvement and low usability activity performance in a project. This research also highlighted the need to improve usability practitioner credibility.

A study done in 2003 of 184 ICT practitioners and 90 usability practitioners in Korea, by Ji and Yun (2006), created two slightly different surveys, one for ICT practitioners and one for usability practitioners. The biggest problem was the difference between project outcomes and customer requirements. Other issues included acceptance of usability activities throughout a project, the need for more usability practitioners, the need for improving usability's credibility and that the usability maturity of organisations needs to be increased. This study also highlighted that usability practitioner credibility can be seen as the basis for the other problems, such as a need for more usability practitioner involvement, acceptance of usability activities within a project lifecycle and the focus on project outcomes rather than user requirements.

Trenner and Bawa (1998) discuss the political issues in performing usability in industry. The major themes discussed include 'Justifying your existence' and 'keeping usability on the political map', among other things. Key lessons learnt in performing usability include: gaining

sponsorship and management support, educating your stakeholders about usability, have great communication skills, push for usability to be institutionalised, be flexible in selection and performing usability activities, capitalise on the benefits of a multi-disciplinary usability team, and be a part of the usability community. The major themes need to be considered to allow focus on the lessons learnt and require usability practitioner credibility at an organisational level.

The performance of usability activities by usability practitioners often falls within the domains of other project team members (Ferrara 2005). In order to improve usability practice in a project, with other project team members, the following advice, given by Ferrara (2005) needs to be considered:

- Demonstrate your respect for others
- Clearly define the decision you expect to influence
- Stay out of decisions that don't affect usability
- Invite other team members to participate in the usability process
- Make your work valuable to everyone
- Appeal to common interests

Often integration of usability activities within a project team is done across the various members of the team. This leads to project team members having a greater understanding of usability, but this shared responsibility also tends to lead to no real usability being performed. Boiver et al. (2006)believe'that usability issues require a "specialist" role'. Having usability practitioners whose role and responsibility lies with usability can ensure the performance of usability activities throughout a development process. Also, ensuring that the set of required usability skills, experience and focus on usability have been added to the project with a specialist usability role would achieve usability value and value in engagement of the usability practitioners.

The most effective way to improve usability understanding, performance of usability activities and usability outcomes is to improve the usability education provided to students (Thimbleby 2009). The prior knowledge and expectations of software development students (Schulte & Magenheim 2005) can impact on the focus when presenting usability processes and activities which require a balance of social and technical aspects. A usability practitioner must be able to communicate and foster relationships with all project stakeholders. They need to be able to speak and understand the various languages spoken by project stakeholders, i.e. Developers, Business Analysts, organisational stakeholders and domain knowledge stakeholders.

2.4.3. Usability Practitioner Skillset

Nielsen discussed one ofthe important aspects of becoming a usability practitioner is ‘to gain that experience’(Nielsen 2002a). Having the theoretical knowledge and problem solving skills is a good basis for usability practice, but having many years experience testing and studying users provides the important experience needed to be an affective usability practitioner. The most successful and influential usability practitioners are often the more experienced ones that are usually in a management position (Robertson, T & Hewlett 2004). The experience gained through the performance of a usability activity and/or the context or specific case that worked well for a given usability activity, need to be stored in an organisations memory. The reuse of successfully articulated guidelines/heuristics, interface designs and interactions styles can enhance future projects. The experience gained from one project should not be lost, rather harnessed and used again (Henninger, Haynes & Reith 1995). This experiential knowledge, if stored within the organisation memory, can improve the effectiveness of usability practitioners.

In order to gauge the skillset of usability practitioners, the performance of a usability capability maturity assessment can be useful to a usability practitioner. Jokela (2004) describes the using of an assessment as a way of being able to explicitly map their understanding and knowledge of the essence of usability and performance of usability activities against a set of key processes within a capability maturity model (CMM). This will challenge a usability practitioner’s usability understanding beyond the integration of usability activities within a project lifecycle. The usability practitioner will be challenged being an assessor for a usability capability maturity assessment.

Where performance of an assessment helps a usability practitioner reflect on usability within projects and within organisations, it is also valuable to reflect on their own practice. Usability practitioner reflection on their own practice, ‘gut feeling or subjective evaluations are not perceived as sufficient’(Følstad, Bark & Gulliksen 2006), may improve their effectiveness. The practise of ‘repeated user tests’ and ‘evaluation meetings’ provides ideal ways to evaluateone’s own practice. This is especially important for usability practitioners that are not working in a usability team.

Usability practitioners need a diverse knowledge of the users, tasks, technology and context of use when conducting their design and evaluation activities in order to make a positive impact on the usability outcome. It is not just user and tasks that require a usability practitioners attention,

but business goals (Hornbæk & Frøkjær 2008), for example, need to be considered also. Usability practitioners need to collaborate with all project stakeholders to enable appropriate consideration of any aspects of the project that may contribute to the usability shared vision for the project.

Some research highlighted a specific set of usability skills needed to be an effective usability practitioner. Dayton (1993) described a set of such attributes, need by a usability practitioner:

- Knowledge: basic HCI literature, or ability to read and understand it, cognitive processes, experimental design, rapid prototyping, quantitative methods, task analysis methods, observational techniques, usability testing, user interfaces, HCI standards & guides.
- Skills: estimating resources (including time) needed to do job, commitment to user, understanding of software development process, understanding of implementation issues, and negotiation skills.
- Attributes Harder to Acquire: Tenacity, Flexibility, Empathy, Willingness to be a generalist, and right attitude

The list of skills, shown in Table 2-10, provides a summary of the required skills of a usability practitioner, as described by Dayton (1993). Often an organisation looking to employ a usability practitioner is uncertain about the skills need to be an affective usability practitioner, who has a positive affect on a project's usability outcome. This study examined data gathered from 16 workshops, from various organisation and universities, across the US, Canada and Sweden.

Practitioner Skills
Knowledge – basic HCI, cognitive process, experimental design, rapid prototyping, quantitative methods, task analysis methods, observational techniques, usability testing, user interfaces, HCO standards and guides, graphic design & visualisation skills, questionnaire and survey design, etc.
Skills – Project and time management – estimate resources needed to do job, keeping real goals in mind, and working with goals, inputs and tools.
Skills – Organizational Behaviour – commitment to user, evangelism, domain knowledge
Skills – Hardware & Software – understand development process, understand implementation issues
Skills – Teamwork – negotiation skill, keeping all players involved, team playing, selling and convincing
Skills – Communication – ability to really listen, interviewing/writing/speaking/influencing/encouraging
Skills – People management – teaching ability, conflict resolution
Attributes hard to acquire – tenacity, flexibility, empathy, willingness to be a generalist, mentoring ability

Table 2-10: Summary list of usability practitioner skills required based on Dayton (1993)

Shroyer (2001), emphasises the recruitment and mentoring process performed in his organisation that provides benefits for both the organisation and professional development of the usability practitioner. Key elements for recruitment are:

- Skilled and versatile, competent in two or more of: usability evaluation, information architecture, user interface design, documentation and online help, and marketing communication.
- Excellent communicators – in person, on the telephone, and in writing/email – working effectively as a team member and with a client.

Communication is a key skill required by usability practitioners. Bloomer and Croft (1997) surmise, that introducing usability into an organisation, requires the usability professional to learn effective ways to communicate the value of usability.

This literature also examined the use of mentoring to improve usability practitioner skillsets. Shroyer (2001) also described key elements for mentoring a new usability practitioner joining an organisation, which include:

- Training in usability methodology – using a staged approach in project involved in and a steadily increasing set of responsibilities within the project.
- Training in project management

- Training in software and systems – learn about organisational document templates and setup of hardware and software requirements of practitioner.
- Training in day-to-day operations – assignment of a‘buddy’ to support new practitioners in understanding how the organisation works.
- Team Building
- Fostering professional growth – encouraging volunteering in professional organisations and publishing at a conference.

The skillsets discussed in this section provide a comprehensive list that can be considered when recruiting usability practitioners. This is supplemented with the use of mentoring to improve skillsets to improve experience, by performing usability activities with a senior, more experienced usability practitioner.

2.4.4. Representing Users

Netta Iivari (2006) describes a usability practitioner as ‘representing the user’ in the project and their actual role as ‘configuring the user’ within the IS during a project lifecycle. Therefore, in order to make sure that the knowledge about the users is represented in the IS, a practitioner needs to be involved in the configuration of the user needs.

Where involvement cannot be attained it is expected that a usability practitioner will become more ‘a “users” advocate in the development projects’(Boivie, Gulliksen & Göransson 2006). Often the project constraints, such as time given and budgetary cost, have an impact on being able to gain user involvement and that often means deployingthe usability practitioner as a user advocate (Robertson, T & Hewlett 2004). This role often falls to the usability practitioner to perform in a project, often reluctantly, since usability practitioners prefer engaging project stakeholders to be involved in usability activities.

This literature review section has highlighted some of the research that has described various aspects of usability practitioners various roles. It has provided studies that have identified various communities of practice (Iivari 2005), usability practitioner roles in a development process (Iivari, Netta 2006), discussion on credibility sort by usability practitioners within projects and organisations, the various skills identified as important as a usability practitioners, the need to sell the value of engaging a usability practitioner, the support that can be provided

through education and usability tools and the specific role of user advocate that usability practitioners often are asked to perform.

2.4.5. Developer Issues

The communication between usability practitioners and software engineers (developers) is an important aspect in allowing better integration and visibility of usability (Juristo et al. 2007). These two stakeholders need to learn to work together (Milewski 2004), those that have an understanding of the value of the other expect collaboration. This research highlights the involvement of project stakeholders in discussing detailed requirements in conjunction with the expertise of the software engineer and usability expert. The proposed approach encourages a mutual understanding of activities and responsibilities between usability practitioners and software engineers with a view to construct a usable IS. This visibility will enable usability to be done from the start of a project, enabling building of the project usability vision with the users and developersfrom requirement elicitation to allow usability to be considered throughout the project lifecycle.

The mutual understanding of activities performed by usability practitioners and developers can improve the usability of an IS. Jerome and Kazman (2005) discuss the lack of mutual understanding between software engineers and usability practitioners can have a significant impact on a project. The survey of 63 usability practitioners and 33 software engineers, showed this lack of understanding and differences in the view of their roles in the project lifecycle. It also showed a tendency to interact and communicate late in the project lifecycle, often too late for usability activities to have an impact.

In order to improve this usability understanding, it is important to focus on selecting the most appropriate usability activities to integrate in the project lifecycle. It is not enough to simply make a usability activity part of the project lifecycle, developers need to be educated or orientated to at least understand the value in its performance (Ferre 2003). Usability practitioners, as part of their role, need to bridge this gap(Grudin 1991; Juristo et al. 2007) of understanding in order to improve the effectiveness and impact of the usability activities.

The project requirements, defined at the start of a project lifecycle, can restrict or limit what is possible from a usability perspective. Agarwala and Rathod (2006) showed through their study, that people who are internal to the project team view ‘their commitment to serve the customer is

limited to the user requirements stated in terms of the functionality, time and cost'. Grudin (1991) also states 'The reliance on specifications documents imposes a "wall" between users and developers,' further supporting the importance to make usability visible through the project requirements elicited and specified at the start of a project. Also, highlighting the role of usability requirements defined at the start, can help bridge the gap between users and developers.

Developers' understanding of the usability direction needs to go beyond reports in a given project (Cockton 2006).It is important for developers to be engaged to participate in usability activities so that they can gain understanding of the value in usability (Law, C, Jacko & Edwards 2005; Law, CM & McKay 2007). There is a need to education developers in more than the implementation (programming and building) of an IS(van Vliet 2006).The human aspects need to be incorporated into a developer's education or their professional development, and this needs to grow into the establishment of a culture of acknowledging and considering usability in a project lifecycle (Hazzan 2010).

Bridging the gap in understanding of users by developers has been discussed in the literature. If a usability mindset is not developed with developers this often obstructs usability performance (Bak et al. 2008). The main approaches look to promote involvement in usability activities rather than simple usability reports (which maybe improved with videos), and/or improved education of developers in communication and usability techniques.

2.4.6. Defining usability specifications

The development of usability requirements during the initial steps of a project is an important part of defining the usability scope for a project. It provides a project with a vision for what is important to consider in the design, it will provide usability goals and prioritisation of these usability goals. The provision of detailed usability requirements can enhance the interface and interaction design (Golden, John & Bass 2005) for an IS. The direction provided will impact on all aspects of a development lifecycle from analysis and design to evaluation and implementation of theIS. It should not lose its importance in carrying on the shared usability vision during maintenance and enhancements of theIS.

A study presents six styles for usability requirements (Lauesen & Younessi 1998) documents, based on practice and recommendation from experts. Each requirement style looks to define

what happens during development, how data is elicited from the specifications and to what extent does the usability mindset for the project get defined. These styles include:

- Performance style usability requirements specifies a set of tasks where usability is important, defines the various user groups that need usability focus, articulation of tasks and objects for each of these user groups.
- Defect style is similar to the performance style but lists out the usability problems in the IS and their severity.
- Process style looks to the design process to dictate limits on the usability performed. For example, creation of prototypes to focus usability testing on and development activities,
- Subjective style looks to defining a set of criteria to measure satisfaction with the IS. This style looks closely to defining usability for the IS.
- Design style is the traditional requirements style where screen pictures and screen functions are specified like a prototype.
- Guideline style looks to adherence to a set of style guides and standards to get a good usability outcome.

This study highlights, for each style, the tasks to be performed, user groups involved, the verification and tracing to be done, the process of getting the data needed, the pros and cons of the requirement style and an example is provided. The study concludes by contextualising the use of the requirements styles for product development, in-house development, contract development and tendering for development of an IS. This discussion provides a very interesting set of practices to articulate usability requirements for a project. There is no discussion or research on the effect, in given situations, on the usability outcome.

2.4.7. Change Agents

Usability practitioners are asked to improve adoption of usability concept and usability activities. They can do this using various means, from evangelistic approaches, selling or educating, psychological techniques or focus on various success criteria and avoid any known obstacles. The need to improve the adoption of usability is similar to that of a change agent (Rogers 1995) where many of the generalisations described by Rogers (1995) discuss this, such as‘*9-4: Change agent success in securing the adoption of innovations by clients is positively related to empathy*

with clients'. The usability practitioner is the change agent, discussed in Rogers (1995) diffusion of innovation (DOI) theory, where usability is the change agency.

The credibility of the usability practitioner and their usability practices need to be improved with project stakeholders and organisations to enhance usability outcomes attainable. Change agents also look to gain credibility in order to diffuse an innovation (DOI), *'9-10: Change agent success in securing the adoption of innovations by clients is positively related to credibility in the clients' eyes*'. Other DOI generalisations look to fostering relationships with opinion leaders, which, for usability practitioners, are the organisational stakeholders and IT project team members.

Representing users, being user advocates, is a role reluctantly played by usability practitioners in order to bring the primary user to the project team discussions. This is not a role that is played by change agents. It does not provide the best way to improve usability outcomes. Other important skills required by usability practitioners have been discussed that provide an opportunity to develop a more experienced usability practitioner to maximise the potential of usability outcomes.

2.5. The Usability process

This section looks at the inclusion of usability within a project lifecycle (also known as the development process). It will examine various approaches to incorporating usability activities, issues with performance of usability activities and usability problems and look more closely at the usability capability models that look to provide levels of maturity to usability processes.

2.5.1. Incorporating usability into a process

Introducing usability into an organisation

Many researchers discuss the topic of introducing usability into an organisation. The research discusses evangelism and other factors that need to be considered in order to help improve usability maturity to seeing usability value.Levi (2007) describe a project where an organisation went through changes with the project lifecycle that involved adoptions of usability activities. The paper describes the strategies used by usability practitioners to change the organisational culture to better accept it:

- Combine bottom-up and top-down evangelism that make create partnerships among colleagues and managers as well.
- Talk to people about usability using their business or technical language.
- Don’t replace well-established things – such as processes, activities and roles. Instead, start by integrating new ones and demonstrating their value.
- Plan your steps and be patient.
- Collect metrics of your work continually.
- If possible, work in teams or talk to other usability practitioners at your company.
- Work close to the engineering people, not apart from them.
- Extend your professional network.

The above strategies proved successful, completing the full integration of usability with its institutional software development process. The process is an incremental development method which now includes: user research, rapid prototyping, usability consultancy, and user testing, during the phases of requirements, analysis & design, coding and testing. The importance of the initial activities was to pave the way for the introduction by evangelising usability value across the organisation.

Bloomer and Croft (1997) described their experiences introducing usability into a number of organisations. They described various initiatives performed to introduce usability into an organisation, seeTable 2-11. The key activity is the message presented to help sell usability. This research promotes the importance of selling the usability concept and usability activities by choosing the appropriate stakeholders, enlisting in a usability champion, specifying the benefits and various mechanisms communicating across the organisation.

Action	Description
Who do you sell the usability message to	Senior managers Potential Allies Developers Clients and Users Other Internal Groups
Need a Usability Champion	Ideally a Senior manager
Selling usability – the message	Usability can help you meet key business goals Usability can reduce development costs Usability can help meet delivery deadlines Usability can reduce training and support costs Usability means more useful software
How to get message across?	Informing the masses Walking the Corridors Seeing with their own eyes Demonstrating Value

Table 2-11:Key activities required to introduce usability into an organisation (Bloomer & Croft 1997)

Radle and Young (2001) examined the introduction of usability into three global organisations. The results described lessons learnt:

- Excellent interpersonal skills are crucial
- Applying the results from usability activities to improve project success and raise credibility of usability.
- Work directly with users to create high visibility with management, marketing and project teams.
- Even if schedule pressures intensify, try to do something with usability to help raise awareness and understanding
- Expensive usability labs are not necessarily important
- Most of the resistance to usability comes from other pressures (for example the schedule) and lack of information
- No substitute for observing the user interactions first hand

The study describes the importance of having an experienced usability practitioner, utilisation of usability activities for their results and to gain involvement from users that also allowed other project stakeholders to observe activities to further build usability understanding. When project

constraints come up and usability is reduced, there is a need to promote its importance. Selection and performance need to consider resources available.

The studies analysis showed common obstacles that hampered the introduction of usability, see Table 2-12. The outcomes describe project/organisational constraints, collaborative aspects and the importance of developing a usability mindset.

Obstacle	Description
Awareness Level	How many people on site have heard of "user centered design" or "human factors engineering"? Is there a lack of awareness and knowledge about these activities and their benefits?
Usability concept	How much usability expertise exists internally? How many people and what range of skill do they have? Are they formally trained or do they have work experience in usability?
Performance measurements	What performance measures are in place for developers? Are they rewarded for meeting schedules, achieving quality, or both? These measures have a profound impact on the processes used and decisions made.
Feedback sources	What current sources of feedback exist for the development teams? Is feedback limited to comments from the testing department?
Management support and communication	How many managers support the usability effort? Are they front-line managers or executives? How are usability efforts communicated within the organisation?
Marketing positioning	Which marketing pressures are influencing the product most? Is the product functionality greatly needed and so new that users will overlook usability issues at first? Are third-party products an integral part of the deliverables?

Table 2-12: Common Obstacles to introducing usability adapted from(Radle & Young 2001)

Wiebe (2000) presents a usability practitioner's experience in introducing usability in an organisation, highlighting four key areas as important in successfully integrating usability practice into the organisation, business process and project processes. Wiebe (2000) research describes a 'fit of usability in business' by

- Understanding application of text book usability processes is not a substitute and does not match understanding of 'deep realities' of performing usability in practice,
- Group dynamics important for the creating effective workgroups,
- Leadership in aligning personal and corporate goals, obtaining buy in from organisation, effective communication of vision can enhance commitment to usability, and
- The role of values in organisation requires champion of the values of usability.

The collaborative aspects are strongly discussed, with group dynamics, effective communication and need for a usability champion. It highlights the value of usability and improving the usability mindset by incorporating the various project stakeholder goals. The usability practice also needs to be flexible and considered in performance of usability activities.

Buur and Bodker (2002; 2000) looked at improving and refocusing usability practice through the setting up of an appropriate space, i.e. laboratory, for the usability activities to be performed. They refer to this lab as the 'design collaboratorium'. The important factors for this include:

- Remodelling the usability lab, to promote usability and design collaboration, use permanently as a learning space for the project. Allowing reflection on the use context, accumulation of design knowledge, and inspiring innovation.
- Repopulating the lab with active participants, improving the design collaboration, allowing usability practitioners to work together actively with users, project team members and others.
- Setting up of design events, from testing to workshop activities.
- Furbishing the lab with appropriate usability artefacts, from paper mock-ups and prototypes to user profiles and task scenarios.

The introduction of a usability space can be a great way of simulating a work environment that allows usability data to be observed and measured. It allows usability practitioners to remove project stakeholders from their work area and focus their involvement, whether its participation or observing, in the usability activities. This idea of a purpose built usability space is not something discussed much in the literature.

The work of Kerton (1997), when introducing usability into an organisation, described the importance of building sponsorship with the use of a prototype and finding a usability mentor for the project team. Other important steps included the integration of usability activities into the development process, through the creation of a user profile, work analysis, setting usability goals, and a conceptual model design and usability walkthroughs. The final step was to provide a mechanism for the sharing of the learning amongst the various stakeholders of the project. With this last step, it is hoped that it will enable the sharing to increase experience and improve the usability cumulatively. This research is unique in that it highlights a usability mindset that needs to be nurtured among all project stakeholders and continually developed with each project.

Fellenz (1997) describes the introduction of usability into a small organisation which was successful for a number of reasons. The main aim initially was to build the credibility of usability and its various activities within the small organisation. The main reasons for its successful introduction include:

- Company was in a position where it made sense to invest into usability,
- There was support from upper management
- The engineering manager and engineers were educated in the benefits of usability and a relationship of trust and mutual respect was built.
- Setup usability team as a service, approaching design collaboratively, encouraging engineers to own designs,
- Understanding resource limitations, compromise where necessary.
- The collaborative aspects are highlighted in this research with support from senior management and IS project team members. The establishment of a relationship among the project stakeholders is also important to improve collaboration. The usability mindset is important, where usability value must exist first before the introduction of usability can move forward. The education of project stakeholders allowed for further development of usability mindset. The consideration of project constraints and its impact on usability also need consideration.

Mayhew's (1999) views on introducing usability into an organisation that does not currently practice it, were for the usability practitioner, primarily a 'change agent' role.The successful introduction of a new innovation, such as usability, is a difficult task, but it provides a key requirement to improving usability outcomes.

Integrating usability into the development process

The gap between software engineering and the usability perspective is still apparent today, see Figure 2-8, where "System 1" is the focus or "System 2" respectively. In reality there is no overlap between user centered design (usability) and software engineering techniques (Seffah, Desmarais & Metzker 2005). A survey on UCD Integration in the industry (Venturi & Troost 2004) has shown that it is facilitated by management support, infrastructure and communication.

The survey showed that usability has a minor impact in industry, in order to take it seriously they need to consider the factor mentioned.

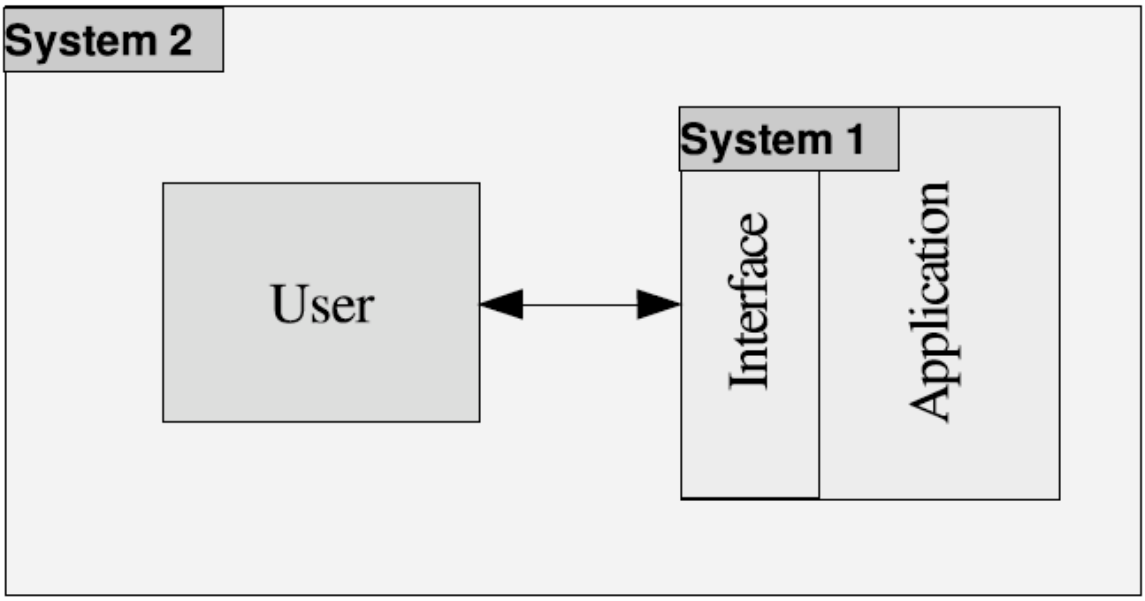

Figure 2-8: The two system perspectives (reproduced from Figure 3.1 Seffah et el. (2005))

The obstacles that can impact on the integration of usability methods and activities with the software engineering methods and activities (Seffah, Desmarais & Metzker 2005; Seffah & Metzker 2004) can include: highly iterative nature of usability which is harder to manage and resource, redesign of an entire lifecycle requires understanding of usability, and often regarded as time consuming or cost intensive. Predominantly the main problem with this integration is the understanding of what usability is, even having a simple understanding of its value to initiate an attempt to integrate.

Sousa et al. (2005)describe a UPi process that involves introduction of usability into the development process. The UPi activities are based on usage centred design rules (Constantine & Lockwood 1999) and RUP best practice (Kruchten 2004). The UPi Activities include:Elicit Stakeholder needs, Find actors and user cases, Structure the use case model, Detail a use case, Review requirements, Define the architecture, Define the UI plan, UI prototyping, Evaluate prototype, Implement components, and Evaluate the system.

The value of integrating usability activities throughout a project lifecycle was highlighted in a study (Bevan, Nigel & Earthy 2001) where a usability capability measure was taken before integration and then after integration. This showed the usability maturity of the project lifecycle and organisation improved and the usability outcomes of project also improved.

Usability activities included from the start of a project is a key factor in achieving a good usability outcome. Cysneiros and Kushniruk (2003) describe the importance of bringing usability to early stages of a software development lifecycle, where the usability goals and requirements are specified and will aide in impacting future design decisions and evaluation to be performed. Instead of bring in usability activities late in the project to validate interfaces through performance of usability evaluations.

Integration of usability activities throughout a project lifecycle is discussed by various studies (Cysneiros & Kushniruk 2003; Ferre 2003; Ferre, Juristo & Moreno 2004; Rohn, Janice Anne 2007; Seffah, Desmarais & Metzker 2005; Sousa, K, Furtado & Mendon 2005; Venturi & Troost 2004), with other research focusing on improving the involvement of project stakeholders throughout a project lifecycle (Følstad, Jørgensen & Krogstie 2004). Often when usability activities have been introduced into a project lifecycle they have predominantly been performed late in a project lifecycle. Many project managers and business analyst will often say that usability is the "user acceptance testing" done at the end of a project lifecycle!

In a survey of 179 usability practitioners, with two or more years experience, the perceived usefulness of usability activities in practice was elicited (Bark, Følstad & Gulliksen 2006). It was found that the usability activities used changed based on the phase in the project lifecycle. In initial phases the highly rated activities included field studies, interviews, use of scenarios, workshops and task analysis (focus groups, surveys and personas rated quite low). The middle phases rated user tests and rapid prototyping activities highly. Heuristic evaluation (Nielsen 1993) rated highly, even though its validity and effectiveness has come into question in the literature (Law, EL-C & Hvannberg 2004) and lack of possible project stakeholder involvement has been addressed in a variation called participatory heuristic evaluation (Muller et al. 1998). Heuristic evaluation rated higher than a cognitive walkthrough and other guidelines, inspection or audit (Nielsen & Mack 1994) orientated evaluations. The end phase was dominated by user tests in the survey results. Expert evaluations and then heuristic evaluation, rated strongly in the later stages of a project lifecycle. A study by Bark et al.(2006) highlights the many usability activities that provide an opportunity for project stakeholder's involvement. The study also examined the optimal and actual involvement of usability practitioner in a project lifecycle. The initial phase was discussed as the most crucial, even though their actual involvement was quite low, with a high involvement in practice in the mid phases. The highest level of involvement in practice was in the end phases of a project lifecycle.

Outsourcing usability

A study, described by Henrik Artman (2002), titled *Procurer Usability Requirements: Negotiations in contract development*, detailed a number of important requirements that procurers should consider when contracting consultants to handle an entire IS project. It can be assumed that the author, in considering usability requirements more heavily as part of an outsourcing document, is interested in improving the usability outcome for the IS project. The study describes various concepts to consider underpinning the contract and placing the importance of usability requirements firmly into the vendors required deliverables for a project.

The various concepts discussed in this study to improve usability requirement consideration and hence the usability outcome of the project includes:

- Shared vision needed 'The procurer and the contractor did not have the same view of usability' and 'the employees who interpreted such process and requirements were not involved in the negotiations with the procurer and did not have a usability perspective on their work'(Artman 2002).
- Usability Understanding needed. Practitioner know how or usability education was needed to improve the level of usability understanding to enable it to be considered during the IS project. One of the practitioners in the project described had taken a course in ISO standards which covered usability concept, but the 'understanding of usability and the aim and function of user-centred activities was quite limited and not really sufficient for specifying unambiguous requirements or explaining the aims of user-centred activities to the contractor project leader'(Artman 2002). 'The contractor regarded usable systems as important, but did not have the competence required for achieving usability given the division of labour within his organization'(Artman 2002). 'precisely define concepts such as usability and methods such as iteration and prototyping, and to precisely explain why such concepts and methods are used and by whom'(Artman 2002).
- Flexible and iterative process is needed 'iterative requirement formulations'(Artman 2002).
- Stakeholder involvement by all stakeholders of the IS project in usability activities is important, 'contractors should be required to proactively participate in all usability activities. Also, it is important to ensure that not only the project leader participates in these activities but also other professionals within the system development team' (Artman 2002).

- Usability Requirements and goals need to be articulated ‘Specifying requirements that do more than merely suffice for interaction with the computer will force the contractor to understand user practice and the procurer’s goal’ (Artman 2002).

This study discussed two organisations that have been examined in detail on the amount of understanding and focus the usability requirements have in an IS project. The project managers had a very poor understanding of usability and it was only seen as a tick box in the development process. Artman (2002) has danced around a key point in his paper. In saying ‘if usability issues are to be considered, they must be explicitly required’ is short sighted. In order for usability to be considered through a development process, and not just by doing usability activities at various stages in a process, it must be evangelised to the all stakeholders. The usability maturity of the organisation’s involved must be considered in order to be able to stipulate the appropriate contract of work, with an appropriate consideration for usability.

2.5.2. Usability activities issues in a process

Software Architecture

The software architecture of an IS is one of the ways in which usability considerations can be built into an IS. ‘Permitting important usability issues to be addressed proactively at architecture design time instead of retroactively after user testing’(Bass & John 2003). The technological constraints that usability practitioners need to deal with can originate from vendor delivered software applications (developed or configured) or in-house developed software architectures and development tools.Research into software architecture is growing because of the need to consider quality assurance issues, including usability. Consideration of usability at an architectural level may have the greatest influence on usability. The following pieces of research look at software architecture as a way to improving usability:

- Bass and John (2000) describe an Attribute-Based Architectural Style (ABAS) tool, which is used as a structured description of particular software quality attributes, producing a collection of ABASs descriptions that focus on the usability quality attribute.
- Creating usability patterns(Stoll, Alfredsson & Lövemark 2008) to support the design of an IS software architecture to help improve usability early in the implementation.

- There are no usability activities that focus on usability at an architectural level (Folmer & Bosch 2004), they predominantly evaluate existing or prototyped interface designs and interaction styles.
- There are opportunities to embed usability into the software architecture (Comstock & Duane 1996) by getting a diverse IS project team, spending time digesting customer data, allow time to reflect and develop an appropriate usability mindset, and facilitate support from the IS manager and organisational managers.
- Other research(Bosch & Juristo 2003; Folmer & Bosch 2005; Rafla, Robillard & Desmarais 2006)have discussed these technological constraints built in at a software architectural level that can impact usability for a project.

Guidelines used for usability audit process

Judging by the various guidelines that can be found in the literature and in commercial organisations, Table 2-5, there is a need to contextualise guidelines, based on various elements of the project, which may require consideration of users, tasks, technology and/or environment. The guidelines often reflect the interaction between these elements, as show in Figure 2-3.

A framework is required to support the usability practitioners in utilising a guidelines inspection as a quick cheap alternative that can be performed throughout a projects lifecycle, such as the framework by Beier et al.(2003)for web application guidelines. The current sets of guidelines are static in nature, and try to be a ‘one size fits all’ guide. A framework would need to enable the articulation of guidelines based on the user, tasks, technology and context of use. Henninger et al. (1995) describes the current set of guidelines being used as technology-centric, focusing on platform-specific interface widgets, or abstract and general-purpose in nature. Usability practitioners implicitly consider a set of guidelines for evaluation and design activities.

Defining a set of usability requirements, specification and/or guidelines to be used throughout a project needs to be defined for a project, but what are the various aspects of the project that needs to be considered? Fitzpatrick and Higgins (1998) imply that a problem exists in defining usability requirements, usability attributes and criteria lists. They suggest three strands to focus on: Software quality, Statutory Obligations, and HCI. These strands seem important but they are formulated at a relatively high abstraction level and don’t provide much support for the usability practitioner. The work done by Gerlach and Kuo (1991) is to enable design practice to become

more systematic and less intuitive than it is today. By providing a structured and categorized set of criteria we want to support design practitioners in understanding and choosing relevant usability criteria. A structured approach is supported by Somervell and McCrickard (2005). They prescribe that the need for creating/choosing criteria lists ought to be a structured process. These different research perspectives suggest importance of focusing on a broad set of criteria (strands) and articulate these criteria using a structured process. This will provide usability practitioners an explicit approach to creating a concrete list of guidelines to support the design and evaluation activities for a given project.

The effectiveness of design and design activities can be enhanced with a set of appropriate designed guidelines. According to Chevalier and Ivory (2003), there is little support for the complexities involved in the design activity. The ability of usability professionals, both novice and expert, to articulate or utilise guidelines during the design process is an important skill, that can enhance the usability of an interface design and interaction style. Furthermore, the work by Tao (2008) suggests a significant gap between the knowledge and application of web design guidelines. The outcome of Tao's (2008) research suggests a strategy for developing web design guideline skills is needed. Support for the need suggested in this study can also be found in Gould and Lewis (1985). They claim, in their study that design guidelines are limited since they are not detailed enough.

The articulation of a set of context-specific guidelines can improve the outcome of design and evaluation activities. Henninger et al. (1995) describe a method for formulating and augmenting guidelines based on experience attained through project work, which are context-specific and which enable a domain-specific set of guidelines to support design work. Experienced based generation of a set of appropriate guidelines can improve the performance of usability activities by usability practitioners. A study (Cronholm & Bruno 2008) puts forward a model for categorising usability guidelines:

- Principles – very abstract guideline providing a general rule
- Advices – characterised by providing human to computer general advice
- Guidelines – detailed guidelines that can be sub-categorised by EIAL (Elementary InterAction Loop), i.e. informing, execution, interpretation, and IS reaction.
- Heuristics – concrete formalisation of the guidelines.

The list provided discusses various level of abstraction at which these guidelines can be defined. This provides a model that enables explicit articulation of a set of usability criteria, with appropriate consider of the level of abstract or concreteness required, and consideration for the various phases of an interaction loop.

2.5.3. Usability problems

The definition of usability, as defined in Section 2.2.1, would imply that a usability problem is something that does not comply with the set of usability attributes that defines the interaction between users, tasks andIS, within a given environment/context. Usability problem can also occur when one or more criteria contravene, compete or conflict with another criteria. The criteria could be the set of attributes that define usability or a set of guidelines, standards, principles, or golden rules etc.

A usability problem can therefore be defined as:

> *An issue that competes or conflicts with the set of attributes that define the usability for a given situation.*

In usability practice the major focus is the performance of usability activities and the resulting usability findings. This section will focus on problem identification, measurements, and severity scales. These aspects to usability issues have been prominently discussed in the literature.

Problem Identification

Identification of usability problems is predominantly done through the performance of a usability evaluation technique, for example Usability Inspection (Nielsen & Mack 1994) or Heuristic evaluation (Nielsen 1993), or Usability testing (Rubin, J 1994). This sort of evaluation is sometimes referred to as a usability audit. The majority of these techniques describe the following general process:

1) Employ Inspector(s) to perform inspection

2) Describe users, tasks and environment in which theIS will be used.

3) Specify in guidelines, criteria, heuristics, standards, and/or principles to be used to aide in the usability inspectors in the evaluation.

4) Evaluate the interaction styles and interface design, based on a list of usability criterion, and identify usability problems

5) Generate a report describing the usability problems, include a severity rating, and provide a possible solution.

The inspector can be one person or a group, performing the activity together or individually. These usability techniques can be done with various stakeholders. Broadly, the stakeholders that may perform a usability inspection include: usability expert/novice, business analyst, developers (or other IS project team members), and subject matter expert (user) (Muller et al. 1998).

The survey of the industry based usability practitioners suggests that these expert evaluations are (Gulliksen et al. 2004) still being performed by usability practitioners. Therefore, these are used to generate many usability problems. Howarth (2006) look to better identify usability problems during usability evaluations. A study by Skov et al.(2005)showed, with the performance of usability evaluations to identify usability problems, that usability experts performed very well, compared to novice practitioners using a tool (developed by researchers) and not using a tool. It has been shown in the literature that experts or experienced evaluators discover more usability problems than novice (Hertzum & Jacobsen 2003; Hornbaek & Frokjaer 2004; Hornbæk & Frøkjær 2008; Skov & Stage 2004). Therefore the skillset and experience of a usability practitioner will have a significant impact on the successful generation of valuable usability findings.

‘Usability problems predicted by evaluation techniques are useful input to systems development; it is uncertain whether redesign proposals aimed at alleviating those problems are likewise useful’(Hornbæk & Frøkjær 2005). This study highlights an interesting problem that is the credibility and importance placed on usability findings by other IS project team members, especially developers. The study showed that development of a redesign proposal was well accepted by developers. The redesign helps categorise the problem, make the problem more concrete and illustrate why it is important to consider. Developers found that they provided inspiration and a source of alternatives to consider. Developers were happy to have both the usability problem description and redesign proposal. The communication was tailored for developers to make the rationale of the usability practitioner clear and argument for change convincing by highlighting the impact on usability.

John and Marks (1997) looked at comparing the effectiveness of usability evaluation techniques by examining the usability problem identified. To be more specific, John and Marks

(1997)explored the identified usability problems that lead to productive changes to the IS. After comparing six different usability evaluation techniques (i.e. Claims Analysis, Cognitive Walkthrough, GOMS, Heuristic Evaluation, User Action Notation, and simply reading the specification) it was found that they were not very effective in identifying usability problems. A framework of predictive power, persuasive power and design-change effectiveness was used to evaluate the usability practitioner discovery of usability problems. This showed over fifty percent usability problems were discovered, of these twenty nine percent were actioned during development, of these another thirty percent were action by the additional persuasion provided.The predictive power of expert usability evaluation techniques has been tested by various researchers (Bligård & Osvalder 2007; John & Marks 1997). In general, it has been found that they are not very effective in identifying usability problems.

Severity scale

A list of identified usability problems needs to be communicated to various stakeholders. One of the pieces of information provided to project stakeholders is the severity rating of discovered usability problems. Usability practitioners often provide a severity rating for each problem to enhance the communication of usability problems. Nielsen (2011b) and Wilson (1999) presents scales that can be used to specify usability problem severity, see Table 2-13.

Rating	Nielsen (Nielsen 2011b)	Rating	(Wilson, C 1999)
0	*I don't agree* that this is a usability problem at all	5	Minimal error
1	*Cosmetic problem only*: need not be fixed unless extra time is available in project	4	Minor but irritating problem
2	*Minor usability problem*: fixing this should be given low priority	3	Moderate problem causing no permanent loss of data, but wasted time.
3	*Major usability problem*: important to fix, so should be given high priority	2	Sever problem causing possible loss of data.
4	Usability catastrophe: imperative to fix before product can be released	1	Catastrophic error causing irrevocable loss of data or damage to the hardware or software.

Table 2-13: Comparison of usability severity ratings

In order to be able to categorise a usability problem against a scale of usability severity, Wilson (1999) has provided a set of attributes that should be considered that included:

- Performance
- Probability of loss of critical data
- Probability of error
- Violations of standards
- Impact on profit, revenue, or expenses
- Aesthetics, readability, clutter

This list provides various project elements, functional issues and interface design issues to consider when evaluating the severity of a usability problem. When testers and developers rate problems discovered with an IS, there is usually no distinction between program problems and usability problems. The user of a severity scale can provide this distinction more clearly.

Communication of usability problems to IS project members is important, in order for usability findings to be considered (Fadden & McQuaid 2003). It can facilitate and encourage fixing of important usability problems first, make appropriate decision when considering priorities of the IS project team (and organisation) to help define the order in which usability findings are presented and dealt with.

CUP (Classification of Usability Problems) (Vilbergsdóttir, Hvannberg & Law 2006) scheme is used to help prioritise and communicate usability problems. It requires some training by novice usability practitioner to use effectively. The reliability of using this framework with usability problems tends to indicate expertise and experience of usability practitioner for rating is a critical factor for applying this technique consistently and effectively. This study provides another approach to classification of usability problems to enable its communication across the project stakeholders.

2.5.4. Usability Capability Maturity Model

There are several different Usability Capability Maturity models (UCM), which have been developed using different research traditions (Jokela et al. 2006) that have lead to very different features in each model. The most common basis for a UCM is the Capability Maturity Model

(CMM) that is pitched at the performance in an organisational process. Later, specific project lifecycle maturity models were developed that focused on the process assessment, such as SPICE (Rout et al. 2007). The various levels of maturity in these CMMs are shown in Table 2-14.

Level	CMM	SPICE
5	Optimising	Optimising
4	Managed	Predictable
3	Defined	Established
2	Repeatable	Managed
1	Initial	Performed
0		Incomplete

Table 2-14: Comparison of Capability Maturity Models

These models provide a set of levels that enable the assessment of various organisational processes to be compared and to gauge the level of maturity the process has attained. There have been various attempts to provide a set of usability capability maturity models. The use of a usability capability maturity assessment can aid in the introduction, improvement and monitoring of usability within an organisation. The purpose of a usability maturity assessment is to evaluate user centred development within organisations or projects (Jokela 2004). The information gathered as part of this assessment can be used to improve the usability processes within an organisation and its project teams. Earthy et al. (2001) also suggests that the assessment is a powerful tool to introduce and train user centered design activities within organisations. A good guide to the purpose for performance of a usability capability assessment depends on what stage or category an organisation finds itself at with usability, this can dictate the type of findings achievable from a capability assessment. Based on study by Jokela (2004), organisation can find themselves in an ‘awakening’ category where findings show a problem with the performance of UCD, or ‘kick-off’ category where more focus is provided performance and usefulness of usability activities, or ‘monitoring’category where an assessment process of usability, or lastly a ‘curiosity’category where all results are reported. The findings generated from a usability capability assessment are based on the category the organisation is at with the concept of usability.

Jokela et al. (2006) identified thirteen UCM models. This discussion and comparison of UCM models describes many differences. Jokela et al. (2006) used five lenses to analyse the thirteen UCM models, these included: ‘approach’, ‘implementation of UCD in practice’, ‘other

organisational viewpoints', 'concrete guidance' and 'empirical evidence'. This analysis has identified three categories: 'standard process assessment', 'tailored process assessment', and 'specific capability assessment'. This literature review will examine each of these approaches by reviewing one in each category to provide a sense of the different UCM models discussed in the literature.

The usability leadership maturity model (ULMM) developed at IBM (Flanagan 1996), focuses on the organisation, skills and processes. This UCM provides a set of nine considerations to make in a capability assessment, see Table 2-15. The three main categories have been sub-categories into nine key capabilities for the capability assessment. This UCM looks to focus on key activities and resources that are needed in order to achieve a high usability maturity level.

Categories	Key assessment capability
Organisation	Organization awareness Organization activities Improvement actions
Skills	HCI skills and impact HCI resources
Process	Early and continual user focus Integrated design Early and continual user test Iterative design

Table 2-15: ULMM looks at nine key assessment capabilities within the three major categories

The KESSU (Jokela 2001) capability assessment model, developed at Oulu university, looks to measure performance rather than look at the various activities and resources available. This UCM looks at seven processes (usability activities) of a user centered project lifecycle and measures the quantity, quality and integration achieved. This focuses on the capability assessment in relation to each of the usability activities, on the quantity of the usability outputs produced, the quality of the method and usability results, and the extent to which the usability finding impact on the usability outcome of the project.

Usability activity	Process performance focus of assessment
1. Identify users	KESSU capability levels
2. Context of use	**Quantity** / **Quality** / **Integration**
3. Determine user requirements	Not achieved / Not achieved / Not achieved
4. Produce user task diagrams	Partially achieved / Partially achieved / Partially achieved
5. Produce interaction designs	Largely achieved / Largely achieved / Largely achieved
6. Usability feedback	Full achieved / Full achieved / Full achieved
7. Usability verification	

Table 2-16: KESSU activity focus and capability assessment criteria and levels

The KESSU capability model provides some good process capabilities, but Jokela and Pekka (2000), surmised that the main requirement for usable products is that usability effectively takes place in the development projects, the appropriate infrastructure to support usability performance, and business management commitment towards usability. These three preliminary dimensions are put forward as dimensions that should be included in a usability capability model rather than simply focus on process. This model provides a limited set of capabilities to focus on, where usability has a broader impact on a project lifecycle and organisational context.

The usability maturity model: process (UMM-P) (Earthy, J. 1999) was developed as part of the European INUSE project. This is a combination of many of the human-centered design process models (Jokela et al. 2006). It defines an additional category to the ISO 15504 software engineering process categories, called 'human-centred design' (HCD), with seven key processes. This capability assessment model looks to the standard set of user centred design processes as an indicator of compliance and usability maturity. This model allows the use of standard assessment tools, such as the levels discussed in Table 2-14, to evaluate the processes (Table 2-17) identified as important from a usability perspective.

Process	User centred design processes
HCD.1	Ensure HCD content in system strategy
HCD.2	Plan the HCD process
HCD.3	Specify the user and organizational requirements
HCD.4	Understand and specify the context of use
HCD.5	Produce design solutions
HCD.6	Evaluate design against requirements
HCD.7	Facilitate the human-system implementation

Table 2-17: UMM-P (Earthy, J. 1999) usability capability maturity model based on seven human-centred design processes

The UMM-P has been expanded on by Human Factors Integration Process Risk Assessment - HFIPRA (Sherwood Jones, Earthy & Arnold 2001), developed as part of a UK government project, to include a more detailed scope of usability processes defined within it (i.e. twenty four processes). The idea behind this model was to provide a more in-depth set of usability techniques and usability considerations. This enables a more detailed usability capability assessment to be performed.

Categories	Processes
HS.1 Life cycle involvement	HS.1.1 Human-system issues in conception
	HS.1.2 Human-system issues in development
	HS.1.3 Human-system issues in production and utilisation
	HS.1.4 Human-system issues in utilisation and support
	HS.1.5 Human-system issues in retirement
HS.2 Integrate human factors	HS.2.1 Human-system issues in business strategy
	HS.2.2 Human-system issues in quality management
	HS.2.3 Human-system issues in authorization and control
	HS.2.4 Management of Human-system issues
	HS.2.5 Human Factors data in trade-off and risk mitigation
	HS.2.6 User involvement
	HS.2.7 Usability engineering integration
	HS.2.8 Develop and re-use Human Factors data
HS.3 Usability engineering	HS.3.1 Context of use
	HS.3.2 User requirements
	HS.3.3 Produce design solutions
	HS.3.4 Human Factors evaluation
HS.4 Human resources	HS.4.1 Human resources strategy
	HS.4.2 Define standard competencies and identify gaps
	HS.4.3 Design staffing solution and delivery plan
	HS.4.4 Evaluate system solutions and obtain feedback

Table 2-18: Summary of the processes evaluated as part of the HFIPRA usability capability maturity model

Jokela et al. (2006)have called for future UCM models to include more concrete guidance, which would provide a better opportunity for its use in practice. The HFIPRA process evaluation for usability provides the most comprehensive list of processes to assess, which is a step in the right direction towards providing a more concrete level of guidance in usability maturity capability assessment. Jokela's(2004) study of eleven organisations where a KESSU capability assessment has been performed provided two interesting insights. Firstly, is the interpretation and view of the assessment team has a critical role in the success or otherwise of the assessment. Secondly,

the purpose of performing the capability assessment can also have an impact on the way the assessment is conducted.

Al-Qaimari (2005) discusses the need for usability capability maturity models to include the capture and dissemination of experience that can be reused to benefit project stakeholders and an organisation. This can be something that is included as part of the optimisation and/or culturalisation of usability in a UCM model.

2.5.5. Summary

The incorporation of usability into a usability process is important, and requires careful planning in order for it to be successful. Various issues, from software architecture and appropriate set of usability specification guidelines and/or goals, need to be considered. The focus on discovering usability problems, classifying the severity of usability and appropriate focus given to solving or considering them with the development process, needs to be considered. All these usability process discussions can have a significant impact on the usability outcome.

2.6. Chapter Summary

The literature provides quite a strong and varied coverage of the definition of usability. There are definitions specified in standards (AS/NZS_4216 1994) and alternative definitions that provide different perspectives, such as universal usability (Shneiderman 2000) and actability (Cronholm, Ågerfalk & Goldkuhl 1999; Cronholm & Goldkuhl 2005). There are also many usability activities covered in the literature. This section provided an overview of usability evaluation activities (both expert and participant orientated in nature) and various design activities.

The literature covers a broad spectrum of characteristics that impact on usability outcomes of an IS. This looks to who the project stakeholders are, the tasks and goals performed with theIS, the technology used and software architecture developed for theIS, the context of use, and cultural and environmental situation ofIS.

The usability practitioner role is a complex one, which requires them to promote usability adoption with project stakeholders and organisations, while also trying to improve their own credibility. Their skillsets and experience provide an important basis for them to perform their role with the usability process and other activities such as usability adoption. They are often

required to be user advocates and to consider other perspective in a project (such as issues with developers). Their involvement in developing a usability specification for a project can enhance the attainability of usability outcomes.

Much of the literature is focused on the usability engineering perspective, with a tactical focus on usability, i.e. performance of usability activities. The literature focuses on the introduction or integration of usability activities within processes and the generation of usability problems. Considerably smaller portion of the usability literature is focused on the strategic aspects of usability. The review done by Butler (1996) describes many tactical issues that can enhance usability, but does not touch on any strategic usability issues.

The usability maturity of an organisation and the project stakeholders provides an important gauge to how well a usability outcome can be attained for a project. Usability capability maturity models provide mechanisms to measure this maturity in relation to usability processes performed. This also provides a more strategic focus on usability within an organisation.

This literature review has illustrated various aspects from the usability literature that has an impact on usability outcomes. There is still much to be investigated in this area, much of the research has been done with limited case studies or limited numbers of stakeholders that often are not necessarily representative of the population being explored. This literature review has provided an extensive discussion on many areas of usability research currently under investigation. This literature review provides a point from which a comparison is made with the findings of this thesis (see Chapter 6).

CHAPTER 3

3. Research Design and Research Methodology

This chapter provides a discussion of the methodology used by the researcher in answering the research question. This chapter provides detailed discussion of the activities done and the sequence in which they were done, in order to emphasize the rigour and validity of the research. This chapter argues the justification for the given research context and research question being answered. It will discuss the reasons behind the methods chosen and examine the process by which the data was elicited, analysed and then formulated to arrive at the findings. Ultimately, this chapter describes the research journey and justifies the path taken to generate the theory for a given phenomena.

Why do this research as qualitative research? It is reflective of the nature of the research being performed. Strauss and Corbin (1990) say that qualitative methods can be used to uncover and understand what lies behind any phenomenon. It allows for new viewpoints on phenomenon, about which quite a bit may be already known. Ultimately, "the aim of qualitative approaches is to achieve a deeper understanding of a phenomenon" (Kvale 1989). Previously published research has focused on performance of usability activities[3] or outcomes of specific activities[4] or

[3] Literature that focuses on performance of usability activities include (Chattratichart & Lindgaard 2008)(Doubleday et al. 1997)(Hollingsed & Novick 2007)(Jeffries et al. 1991)(Law, EL-C & Hvannberg 2004)(Muller et al. 1998)(Nielsen 2011a)(Sears 1997)

[4] Literature that focuses on usability activity outcomes include (Alva et al. 2003; Barki & Hartwick 1994; Bevan, Nigel & Macleod 1994; Frøkjær & Hornbæk 2004; Hartson, Andre &

development of a user-centered methodology to be used[5] or improving the usability maturity of the organisation[6] or improving the stakeholder involvement[7]. This research is looking to examine the notion of improving the usability outcome for a given project. This has been done by examining the experience of usability practitioners, who has been involved in projects, to understand their perceptions of what aspects of industry practice impacts on the usability outcome of a project.

There are four major components to this qualitative research: first, the data collected from interviewing usability practitioners; second, the analytical process used to arrive at the research findings; third, the enfolding of the findings with related literature; finally, the written reports on all or specific aspects of the findings to enable their dissemination at conferences, in journals and presentations.

The qualitative research methodology used in this research is Grounded Theory as extended by Eisenhardt (1989). Grounded theory as presented by Strauss and Corbin (1998), describes the theory generated as 'inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon'. This process allows this research to examine an area of interest for this research, and allows the theory to emerge from the data obtained. The aim of this research method is to build theory rather than test theory. This is discussed further in Section 3.6.

Williges 2001; Hertzum & Jacobsen 2001; John & Marks 1997; Lavery, Cockton & Atkinson 1997; Nielsen 1992)

[5] Literature that examines methodology and usability (Anderson, J et al. 2001; Göransson, Lif & Gulliksen 2003; Mackay et al. 2000; Rusu, Rusu & Roncagliolo 2008; Sousa, K, Furtado & Mendon 2005; Sousa, KS & Furtado 2003)

[6] Literature that describe usability maturity (Earthy, J. 1998, 1999; Fraser, Moultrie & Gregory 2002; Jokela et al. 2006; Nielsen 2005; Schorsch 1996)

[7] Literature that looks at stakeholder involvement in usability activities (Barki & Hartwick 1989; Barki & Jon 1994; Fruhling & Vreede 2006; Iivari 2004; Iivari, N. 2006; Ives & Olson 1984; Kujala 2003; Swanson 1974)

The data collected through qualitative interviews has used open-ended questions, which is discussed in more detail in Section 3.8. The reason for leaving all questions open was to reduce the amount of tainting or leading of the interviewee to a particular direction for this research. This allows each participant to describe their stories in their own words, without a slant or bias from the researcher. This is the primary data source for this research.

This chapter will start with a discussion of the research question (Section 3.1) to be answered by this research, followed by a detailed description of the research process that was used (Section 3.2). Then, the limitation of this research and researcher bias is discussed (Section 3.4), followed by a discussion on the participants recruited as part of this research (Section 3.5) that includes a discussion on sample sizes and theoretical sampling. Section 3.6 details the research analysis that was used by this researchand a discussion about the tool used to aide in the analysis (section **Error! Unknown switch argument.**), plus adiscussion on the instrument used (qualitative interviews) with details of the open questions asked (section 3.8).

3.1. Research Question

This research study has answered the following research question:

> ***What issues impact the usability outcome of a project, as perceived by usability practitioners?***

The research question drives the choice of methodology chosen. This open ended broad question could not be answered with a single ethnographic study or with a broad survey tool. In order to obtain a rich in-depth source of data, interviews were performed.

Other subsidiary questions linked to the main question that were answered by this research are:

> ***What should be the role of usability practitioners in a project?***
>
> ***How should project stakeholders engage with usability in a project?***

The analysis that formed the theory that answered these questions has been discussed in the analysis and theory development (Chapter 5) and enfolding literature (Chapter 6) chapters.The final theory that answers these research questions has been presented in the conclusion chapter (Chapter 7).

To answer the main research question and provide insight into the answering of the subsidiary question, data was elicited from current usability practitioners, and analysed. This provides a real life perspective on the performance of usability in projects. The resulting theory was used to answer the research questions from the perspective of usability practitioners.

The study of industry practice provides a real perspective on issues that impact on achieving a good usability outcome (Bloomer & Wolfe 1999; Gulliksen et al. 2004; Sherman 2006). The articulation of critical issues that result in a good usability outcome will provide academics and practitioners with valuable insights. Novice practitioners can be made aware of the critical issues, better equipping them when performing usability activities within a project. Academics can better prepare students, especially IS students, in the critical issues that will impact on the usability outcome of a project.

3.2. Research Design - Why build grounded theory?

The research methodology choices(Denzin & Lincoln 2005)considered for this thesis research included:

- Grounded theory
- Ethnographical study

An ethnographic study would have involved one or two case studies where the researcher would participate in an industry project or simply observe (Denzin & Lincoln 2005). This would require sponsorship by an industry partner and would require a longitudinal study across an entire project lifecycle. The selection of an appropriately sized case study would be required to enable a sufficiently complex environment where usability outcomes can be measured based on the various project variables. This would also narrow the scope of the data collection.

One on one interviews (Denzin & Lincoln 2005)provide a more in-depth data collection opportunity. The access to the participants targeted by this research is readily available. The type of data collected would allow the best opportunity to answer the research question.

The key balance that needed to be achieved, for this research, was which method provides a greater depth of data, rather than a breadth of data, in order to ascertain the various aspects that impact on the research question? Therefore interviews of usability practitioners have been performed with a grounded theory methodology for analysis.

The methodology used, Grounded Theory, favours an interpretive philosophy in relation to analysis of the data to generate theory. This same philosophical position of interpretive research is shared with other methodologies such as critical realism, phenomenology and hermeneutics (Walsham 2006). The data collected and interpreted from in-depth interviews can be described as, 'What we call our data are really our own constructions of other people's constructions of what they and their compatriots are up to'(Geertz 1973). This insight puts into perspective the data on which an interpretivist must work with when performing their analysis.

The interpretivist nature of this study can be compared against the seven principles for interpretive field research, as discussed by Klein and Myers (1999). This provides a rigour to the interpretive nature of research that basically includes:

1. The Fundamental principle of the hermeneutic circle that suggests human understanding is achieved by iterating between considering interdependent meaning of usability concepts and the theory that they form. Section 3.6 provides a description of the various iterations performed during the analysis of the primary data. This highlights the various ways in which this research has examined the meaning of the concepts that have been revealed by the interview data.
2. The principle of contextualization is the focus on the context of the research, so that the people in the area of usability can understand the study and the results that emerge. The conclusion chapter provides a discussion that brings the results of the analysis done in this thesis back to the usability context for industry, research and education.
3. The principle of interaction between the researchers and the subjects requires critical reflection on how the data was obtained through the qualitative interviews performed. The analysis performed required reflection by the researcher through the memos generated (as part of the grounded theory methodology) across interviews and emergent concepts.
4. The principle of abstraction and generalisation describe how the concepts are revealed through the interpretation (described by principle one and two) of data. The analysis (Chapter 5) chapter provides a detailed description of the emergent concepts and the process by which the theory has been generated.
5. The principle of dialogical reasoning requires sensitivity to contradictions between the literature and the actual findings of the study. The literature comparison (Chapter 6) chapter, or as Eisenhardt (1989)puts it, the "literature enfolding" chapter, provides sensitivity to the current literature and supports the findings of this research.

6. The principle of multiple interpretations requires sensitivity to possible differences in interpretations among the interviewed practitioners in their understanding of usability. This principle was considered during the iterative analysis (Section 3.6) performed on the interview transcripts.
7. The principle of suspicion requires sensitivity to possible "biases" or "distortions" in the transcripts collected from interviewees. The construction of the open interview questions (discussed in Section 3.8) reduced the possible biases, along with various analysis techniques used (Section 3.6).

This research builds theory that was grounded in the data collected. Well constructed grounded theory must meet four basic criteria for the applicability of theory generated, as described by Glass and Strauss (1967). In the case of this research, the reality being explored, where the induction from the data collected must fit with the domain of usability practice, enabling it to be understood by the people involved in the study (interviewees) and all other usability practitioners. The theory should be abstract and general enough that it will apply to various contexts within the domain of usability practice. Finally the theory should provide control, allowing the relationships between the concepts derived from the data to guide action within the domain of usability practice.

This thesis uses a systematic set of procedures that are applied in an inductive approach to derive the grounded theory about the domain of usability practice. Grounded theory approach will ultimately build theory that is faithful and highlights the domain of usability practice being investigated. The aim is to produce theory not test theory.

Pure Grounded Theory dictates no preconceived ideas of the research area being analysed. But, avoiding the literature was not an option, since it is a formal requirement of the PhD Study to conduct a review of the literature. It was later that this researcher selected Grounded Theory, once a better idea of the research topic and the various research methodologies available were understood. Then one was selected to best suit the area of interest and the data collection method.

The research plan (Section3.3) utilises an approach by Eisenhardt (1989) that assumes some knowledge of the literature which is supported by Multi-Grounded Theory (MGT) approach (Cronholm 2005). It also looks to validate theory generated by enfolding outcomes with the literature. This methodology describes various elements that inform the theory development, it also alludes to the empirical grounding, theoretical grounding and internal grounding of the

theory developed. Eisenhardt's (1989) building theories methodology has been a very well cited research paper, with over 11,500 citations on Google scholar (google.com 2011). The research community has accepted this research methodology positively and the methodology for building theory has been used by many other research projects.

Surveys (Denzin & Lincoln 2005) in the usability research area have been done previously and have been very focused. With an immature usability industry it is hard to use the appropriate terminology to ask questions; it would be difficult to gauge the critical success factors with a prescribed set of questions without knowledge of what usability aspects to examine. This research methodology was seriously considered. A preliminary survey instrument was built, based on previous survey studies and analysis of the literature, but was found to be insufficient in gathering the required depth of data required to answer the research question.

Performance of a quantitative study was considered through the use of a survey instrument, but no previous study specifically targeted the impact of performing usability in an IS project on the usability outcomes existed, except for some initial work with information architects (Robertson, T & Hewlett 2004). This research examined the possibility of creating a structured questionnaire and semi structured questionnaire, but found the number of variables, complexity of the interactions, variation of usability terminology used, number of activities and process were large. The complex problem could not be examined in this way, because of the number of possibilities that would need to be considered for a quantitative study of this sort.

The research question, in a grounded theory study, is a statement that identifies the phenomenon, the domain of usability practice, to be studied. It has changed during the research journey during the interpretation and inductive iteration in the research plan.Strauss and Corbin (1990) provided excellent coverage of the basics of grounded theory, providing procedures to groom the researcher in ways to analyse the rich data obtained, and aid in reaching a higher level of theoretical sensitivity.

This research has ensured a constant comparison of the analysis of each interview with previous interviews. Each interview provides data from each practitioner's perspective, in varying project situations, different contexts where usability activities have been applied. These aspects need to be examined in detail with each interview. Each individual brings a different set of experiences, and different set of usability projects and stories to describe. Each individual has worked in different organisational structures, i.e. consultancy or organisationally based. The usability

activities vary between stories and these activities are not the sole focus of why a project's usability outcome was a success or not.

McMurray et al. (2004) describe grounded theory very succinctly, 'suggests that data is gathered within a reflective framework where a broad research question is raised. Interviews are conducted, the data or recorded statements from the interviews are analysed, and a second set ofinterviews is conducted. After that, further analysis occurs with reflection and the formulation of provisional hypotheses'. The reflective aspect of the methodology used is a key part of understanding and making links (relationships) in the data, concepts and themes coded. It can't be stressed enough, how important it is to be able to regularly reflect on what has been done throughout the various iterations performed by the researcher of this thesis during the research plan. A computer-aided tool such as NVivo (QSRInternational 2011), cannot replace this brain work, only support it.

Ultimately Grounded Theory is being used to generate/build theory. This research is not testing a hypothesis, but rather putting forward a theory that explains, provides insight, on the research question posed on the phenomenon examined. 'A set of well-developed concepts related through statements of relationship, together constitute an integrated framework that can be used to explain or predict phenomena'(Glaser, Barney G & Strauss 1967).

3.3. Methodology

This section describes the key elements of the research journey taken in this thesis. It provides the key elements and processes used to facilitate the research plan and deliverrigour and validity to the research outcome of this thesis. Research design is the 'science (and art) of planning procedures for conducting studies so as to get the most valid findings'(Vogt 1993). As Yin (1989) simply put it, 'a research design is an action plan for getting from here to there, where *here* may be defined as the initial set of questions to be answered, and *there* is some set of conclusions (answers) about those questions'.

This section will provide an understanding of the research plan. A high-level conceptual research model is discussed (Figure 3-1), showing the key elements and methods being employed to get from *here* to *there*. This will then be followed with a more detailed discussion of the process plan and the various analytical methods used (Figure 3-2) to get from *here* to *there*.

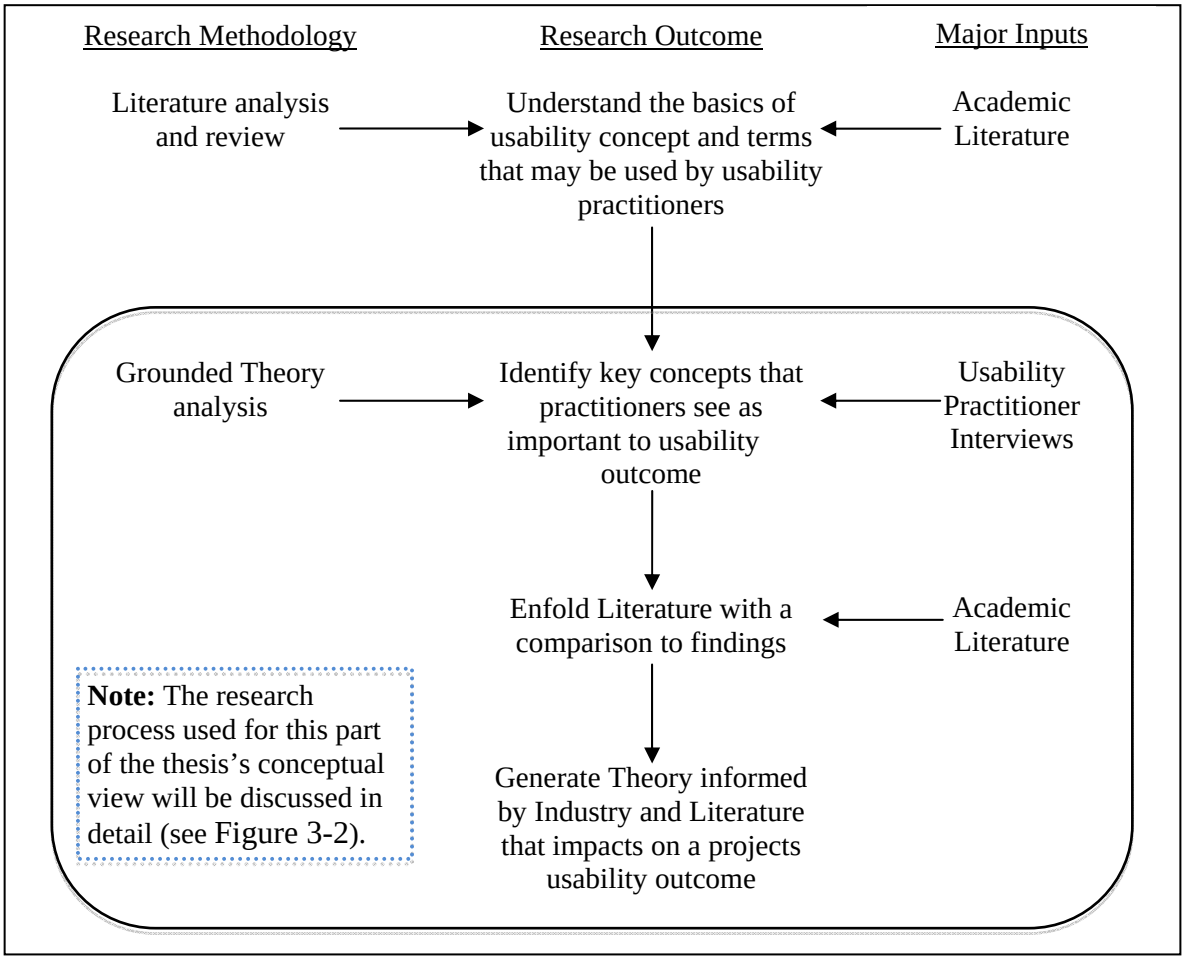

Figure 3-1: A conceptual view of the research process showing: major inputs, methods and outcomes, based on Eisenhardt (1989)

Analysis of the literature led this researcher to a better understanding of usability and the various activities performed by practitioners and researchers. This enabled better engagement with the usability practitioners interviewed in this research. The literature analysis was also a catalyst for stimulating new ideas for this research (Neuman 2005) and framed the initial research questions.

A literature review includes the following goals (Neuman 2005): demonstrate a familiarity with a body of knowledge and establish credibility with the usability practitioners interviewed; show the path of prior research and how this thesis is linked to it; integrate and summarise what is known in the usability area; and to learn from others and stimulate new ideas. The final point is the most important for this thesis research. Learning from the literature allowed better communication with participants of this research (interviewees) and it shaped and focused the direction taken by the research.

The rich interview data in this research came from twenty-one usability practitioner interviews. This is not a large sample size, in respect to quantitative studies, but in relation to a qualitative study it provides a large amount of data, due to the richness and depth of the data obtained. Mintzberg (1979) supported small sample sizes suggesting that in certain situations a smaller sample size can yield more useful research results than a large sample (Section 3.5 discusses this further). For the purpose of theory building, there is a need for depth and richness from the research data source, which is what the stories gained through interviews provided to this research (Section 3.8 discusses this further).

In order to increase the validity and reliability of the outcomes of this research a research plan was developed. The research plan used in this research was based on the research process described by Eisenhardt (1989), on the building of theory from case study research. The process includes the following steps, as shown pictorially in Figure 3-2:

1) Getting started by defining the *research question* (at least in broad terms). This provides the research with a focus, which will help examine the large volume of data to be collected. Defining this question and research focus is helpful, but it must be equally recognised as tentative, because the research question may evolve during the research. The research findings may yield serendipitous results that may lead to refocusing the research question. The research question is discussed in more detail in Section 3.1.

2) *Selecting cases* from the population is the research sample from which participants has been drawn from. This will help reduce variation and defines limits for generalising the findings. The cases for this research have been limited to usability practitioners with a minimum of five years usability experience in industry. See section 3.5 for further discussion

3) *Crafting Instruments and protocols* describes the mechanism for gathering data. This research has performed interviews that include a set of open research questions that have generated a large volume of qualitative data. This is discussed in more detail in Section 3.8.

4) *Entering the field*, gathering data and performing coding and analysis of the data is a key feature of building theory from case studies. The degree of overlap between the three activities may vary from research to research. Along with the transcription of these interviews, there are notes taken at the time of the interviews.

5) *Analysing data* is an important part of bridging the gap between data collected and the findings of the research. There are some key analysis steps that have been performed, see section 3.6 for a discussion.

6) *Shaping hypotheses*, from the within interview analysis, and various cross-interview analysis tactics and overall impressions, tentative themes, concepts, and possible relationships between concepts begin to emerge. In shaping the hypotheses, a highly iterative process is entered to compare systematically the emergent theory with the evidence in each interview. A close fit of the theory with the majority of the interviews provides higher empirical validity of the theory generated.

7) *Enfolding literature*is an essential part of theory building. It requires a comparison of the emergent concepts, theory or hypotheses found in the current literature. This requires reviewing similar theories that support or contradict the emergent theory of this research and postulate why it supports or contradicts it. This research will be considering a broad range of reviewed literature. This enhances the internal validity, generalisabilityand the theoretical level of the theory built. Enfolding the literature is crucial, because the number of interviews performed is of a limited number.

8) *Reaching Closure* involves deciding when to stop adding interviews and when to stop iterating between theory and data in the generation of theory. This involves theoretical saturation that is combined with pragmatic considerations such as time and money, in dictating when this process ends.

The research process showing the analysis steps performed (based on the grounded theory approach described in this chapter) is shown in Figure 3-2. The ellipses describe the various steps in the process, where the numbered step correspond to Eisenhardt's (1989) research process component for generation of theory, described previously. Figure 3-2 is further augmented with the conceptual components (in bold), involved in performing a grounded theory analysis of the data, i.e. open coding, axial coding, and selective coding.

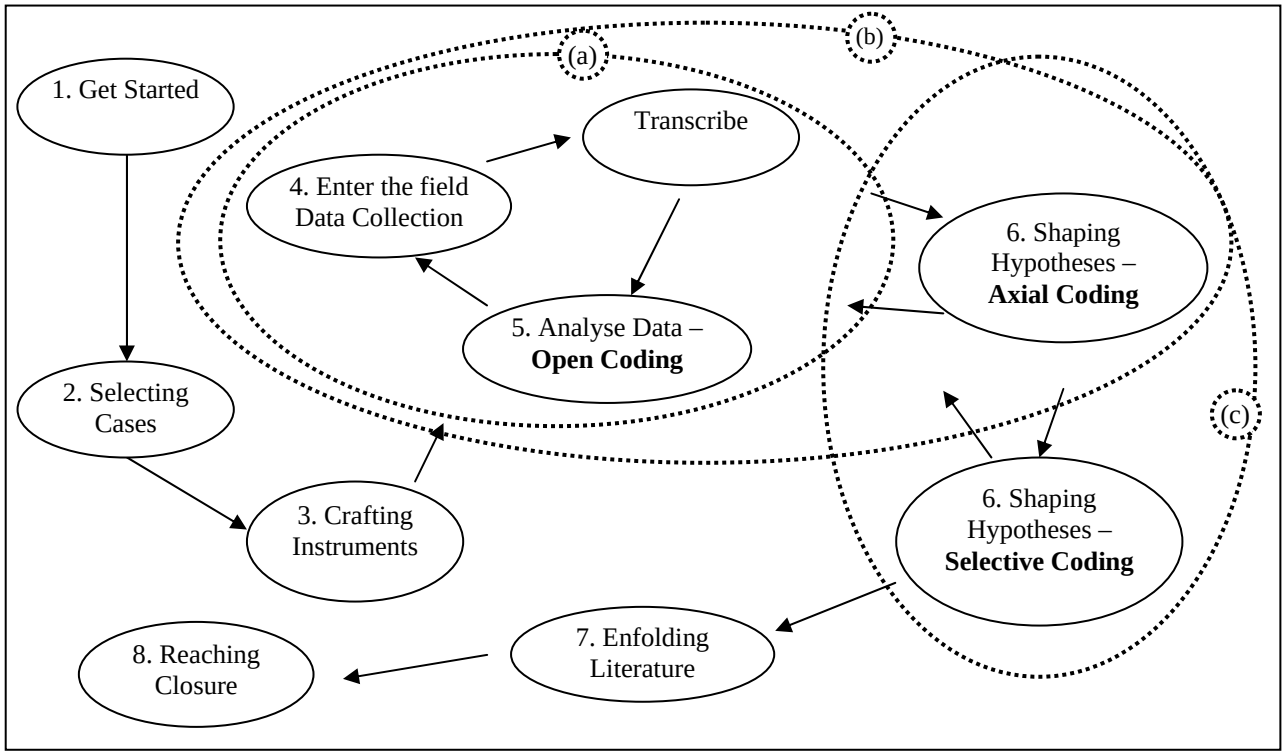

Figure 3-2: Eisenhardt (1989) theory building process combined with the Grounded Theory Analytical Process (Strauss & Corbin 1990)

The iterative loops (shown in Figure 3-2) are key elements to the research process. The iterative parts of the research process are shown using dotted ellipses. The figure shows three iterative loops (a), (b) and (c). First iteration (a) occurred with the data collection, where interviews were held in the field, transcribed, and then analysed (Open Coding). Second iteration (b) is performed after a number of iterations of the first iterative loop (a) have been performed, during this iteration the shaping of the hypotheses is considered (Axial Coding).The third iteration (c) describes further shaping of the hypothesis towards theory generation (Selective Coding). The process therefore allows performance of iterative cycles (a), (b) and (c), which includes steps 4 through to 6, to be iteratively performed, based on the findings and perceived theoretical saturation between the various iteration boundaries.

The perceived theoretical saturation occurred after looping through one of the iterative loops described (a,b or c). When theeach of the initialiterations (a) yielded similar concepts, this signalled moving onto the second iteration (b) allows the examination of the initial analysis across data collected. This similar scenario occurred when moving from iteration (b) to (c), but once the analysis was exhausted further interviews were performed so the initial iteration (a) is

recommenced. The final saturation point reached through iterative loop (c) that leads to the final steps 7 and 8, *Reaching closure*, of the research process. The number of interviews performed was dependent on reaching this final saturation point. Reaching theoretical saturation is discussed in more detail in Section 3.5.

The enfolding of literature allows the researcher, once saturation is reached in the analysis process, to draw on the literature to either confirm or disprove findings, and/or show where the literature stands in relation to the findings (Strauss & Corbin 1998). 'Bringing the literature into the writing not only demonstrates scholarliness but also allows for extending, validating and refining knowledge in the field' (Strauss & Corbin 1998).

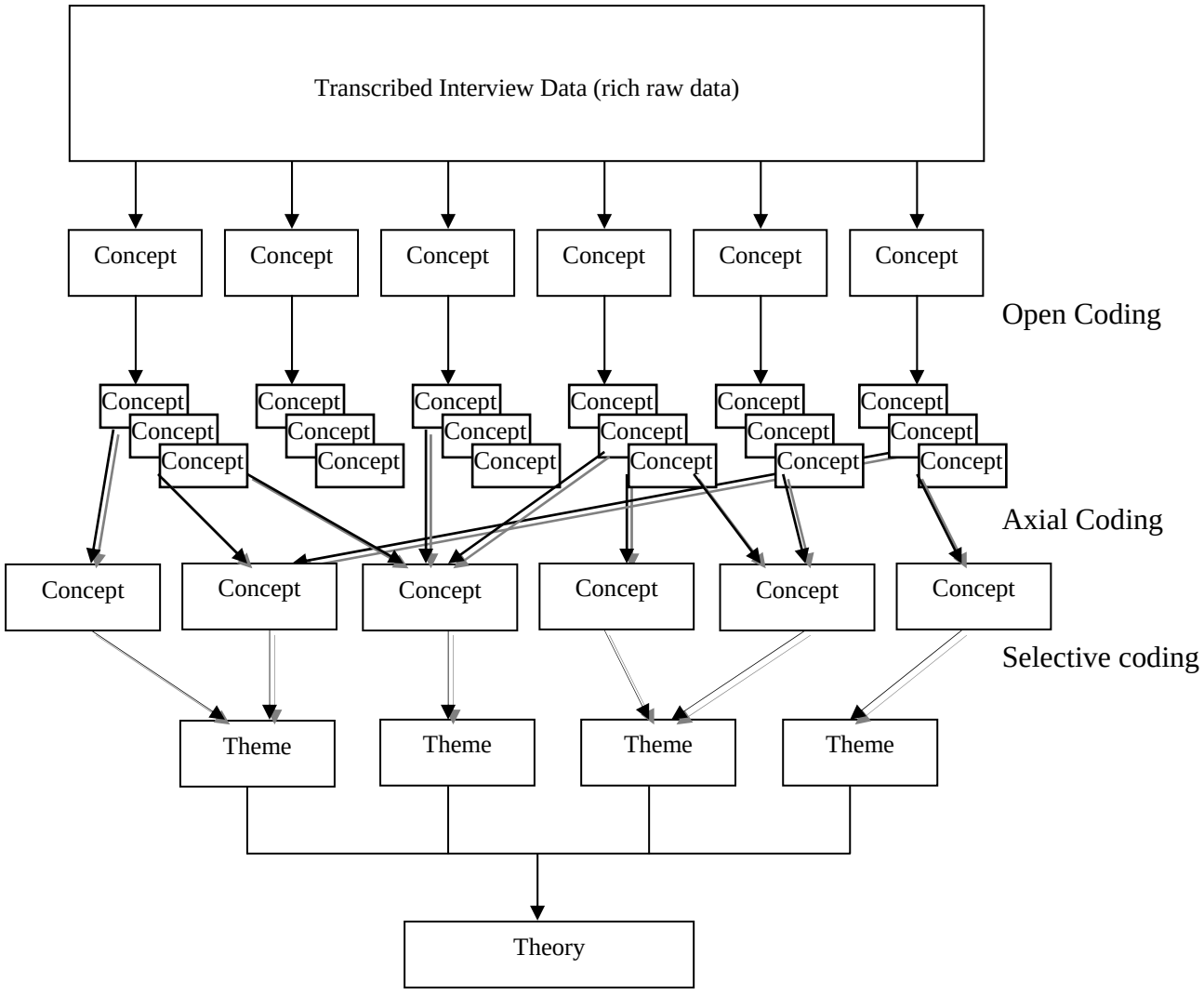

Figure 3-3: Transformation of data from raw collected data to theory.

This research process provides the backbone for building theory rather than testing it. It provides the researcher analytical tools for handling large amounts of raw data. Using the grounded theory analytical tools provides alternative consideration for meaning and discovery of phenomena (Strauss & Corbin 1998).

Figure 3-3, shows the way this research process enables large amounts of raw data to be transformed and broken up into concepts, refined into themes and then reconstructed into categories and ultimately a theory. The research process allows the researcher to be systematic, while at the same time being creative, in the analysis. The process allows the identification, development and the relating of concepts and themes that provide the building blocks for constructinga theory.

3.4. Identify limitations - Researcher Bias

This researcher is not a usability practitioner and has never worked in the capacity of a usability practitioner professional in an industry setting. This researcher has been an analyst programmer on various IS projects, which never involved a usability practitioner as part of the project team member or as a consultant, or any formal usability activities in the development process being used. This researcher in the capacity of a developer did incidental usability by development and presentation of prototypes to users during development. The usability knowledge attained is mainly through master's level electives (Usability Engineering and HCI), and research literature (such as books, journal articles, and conference papers). Therefore this researcher has entered the field with an open mind, having reflected on past experiences in industry and academia, in relation to the role played by usability practitioners within project teams, organisations and industry groups.

The literature review and other readings in relation to usability has provided this researcher with the vocabulary needed to interact and understand discussions with usability practitioners during the data collection (interviews) activity. As discussed by Trauth (1997), using a qualitative method may lead to getting to know interviewees and this closer engagement provides an opportunity for personal growth that helps question and challenge preconceived assumptions. It was expected by this researcher that learning about the usability industry would be done through the interviews. What was not expected was the additional learning about a research methodology and about one's self and the reflection required to produce theory.

This researcher does have an extensive background of working within a project team, as primarily an analyst/programmer. This experience has obscured the initial analysis by hiding important developmental issues. These issues relate to the development roles that can have an

impact on usability outcome of a project. This researcher has had to re-examine the development area, especially when it was highlighted by two of the later interviewees, who were industrial psychologists. This caused another iteration of open coding that required a revisit of all previous interviews, with this concept front of mind.

Grounded theory literature (Glaser, Barney G & Strauss 1967) provides a comprehensive list of characteristics which a researcher should focus on, including: the ability to step back and critically analyse situations, the ability to recognise any tendency toward a bias (as discussed previously),conceptualise or generalise (understanding that each concept can have multiple meanings), a sensitivity to words and phrases discussed by interviewees and a sense of absorption and adherence to the research plan. With these research biases and advice in mind the research analysis was performed as discussed in section 3.6.

3.5. Participant Recruitment and Sample Size

The key data sources for this research are the stories elicited from usability practitioners who have worked in the usability industry for a minimum of 5 years. These stories describe their participation in IS projects where they were employed or contracted to perform usability activities within an organisation or as a consultant for an organisation.

Usability practitioners had to be involved in performing usability activities. Therefore, business analysts, programmers, programmer analysts, project managers, and project directors were eliminated from this study. The anonymity of the participants and their identity was respected, based on the research ethics and procedures used to conduct this research. This was done in accordance to the RMIT University (2010) ethics policy, where ethics approval was gained for interviewing of participants for this research. See consent form in Appendix A and Plain Language statement in Appendix B.

These participants were recruited using various means. This research started with an email on the CHISIG (2011) (Computer Human Interaction Special Interest Group) mailing list, which provided many participants. Various locally based usability consultancy companies were also contacted. The practitioners interviewed also provided further usability practitioner contacts. This research continued to perform interviews until saturation of data was attained, i.e. when no significantly new concepts were appearing in the analysis.

Ethics approval was obtained for the audio recording of each interview session. Each interview was then transcribed into text and loaded into a qualitative analysis tool, NVivo (QSRInternational 2011). The tool facilitated the "coding" of interesting concepts in each transcript, things that may be significant for the general area of this research question and warrant more analysis. The tool also enables queries of raw data and coded concepts to facilitate the axial and selective coding, as per research methodology analysis performed.

The total number of participants interviewed in this research was twenty-one. Mintzberg (1979) highlights that research 'should not preclude the small sample, which has often proved superior'. This small sample size is often characteristic of qualitative research that involves in-depth interview data. The data in this study required continual analysis, with multiple iterations and the small sample size enabled the emergent theory to be more manageable in the researcher's mind during all stages of the research (Crouch & McKenzie 2006). Comparison between quantitative and qualitative research often states large or small sample size respectively (Thompson, CB & Walker 1998). An increase in sample size may improve reliability of results but does not significantly improve the generalisations of a sample to its population (Lee, AS & Baskerville 2003). This research has interviewed twenty-one usability practitioners and gathered rich in-depth data, focusing on stories about the impact on the usability outcome of an IS project.

The number of interviews performed, in a grounded theory methodology, is dictated by the theoretical sampling having reached theoretical saturation. The theoretical sampling is done based on the emerging concepts, the numbers of interviewees are not known, and even the type of interviewees may not be fixed yet. This research started with the idea of interviewing usability practitioners, not knowing how many would be interviewed. The interviews continue, i.e. data collection, until the researcher achieves theoretical saturation, which is the point where no additional data will add to the emerging concepts being developed and examined. (Eisenhardt 1989; Strauss & Corbin 1998; Taylor & Bogdan 1998) Therefore the number of usability practitioners interviewed by this research stopped at twenty-one interviews, after no significantly new concepts were emerging from the data collected. In the analysis discussion (Section 5.3.4), in one of the earlier interviews (eighth) describes an experienced practitioner who had discussed the majority of the concepts. At this point all the interviews from first through to the eighth had covered all the major concepts and themes that have emerged in this research. Later interviews have added weight to the concepts and enabled surfacing of concepts not initially picked up during the initial analysis.

3.6. Research Analysis

The research methodology being used to analyse this rich source of data is grounded theory which was originally expressed by Glaser and Strauss (1967). Since then, there have been several variations of this methodology (Charmaz 2006; Glaser, Barney G. 1992). This thesis is based upon the variation outlined by Strauss and Corbin (1998). This methodology provides a mechanism to iteratively gather and analyse data and build a set of concepts. The process assumes no prior knowledge in the topic area. Therefore the analysis focuses on anything of interest, that emerges from the raw data, which can be described as an interpretive-inductive process. Rather than starting with a theory that needs to be proven, this research process begins with an area of interest, in this case improving usability outcomes in IS projects, and allows theory to emerge from the collected data. 'Theory derived from data is more likely to resemble the "reality" than is theory derived by putting together a series of concepts based on experience or solely through speculation (how one thinks things ought to work)' (Strauss & Corbin 1998)

The analysis began with what is known as 'Microscopic Examination of Data'(Strauss & Corbin 1998). This is defined as 'The detailed line-by-line analysis necessary at the beginning of a study to generate initial categories (with their concepts and themes) and to suggest relationships among categories; a combination of open and axial coding'(Strauss & Corbin 1998). The transcribed interviews were analysed line-by-line and any concepts of interest were identified and coded. This initial step provided a base set of concepts. During this coding, the research created memos, to record thoughts and ideas.

The initial set of concepts were then analysed individually, each of the interview quotes (data) were compared to each other, certifying that they belonged to the concept. Then each of the concepts were broken up and analysed across the various questions asked during each interview (see section 3.8 for interview questions). Each concept was then examined and further broken up into themes.

Within this methodological analysis are various techniques to aidin sifting through the data collected. These techniques, as described by various authors (Eisenhardt 1989; Strauss & Corbin 1990, 1998), include:

- Within case analysis, where each interview was examined individually, and interesting concepts coded. This produce the initial set of coded references, see Appendix G.
- Cross-Case patterns allowing comparison across each interview using various techniques. This may include examining within concept data and looking at the difference between

interviews. Each of the initial concepts (Appendix G) have been examined individually and memo created describing its meaning across the interviews.

- Comparing pairs of interviews for differences. Relationships between interviews and coded concepts were compared and matched for strong correlations between them. This was primarily done using the matrix comparison query tool, in NVivo (QSRInternational 2011), which enabled comparison of a row of coded concepts against a column of coded concepts that matched a condition (i.e. predominantly when an utterance was found to be coded with both concepts).
- Theoretical comparisons - Compare incident to something else at a conceptual level looking for similarities and differences in properties and dimensions. The memos created from the initial concepts provided a conceptual level set of codes (Appendix F) that enabled comparison between a higher level of concepts to be generated.
- The use of questioning such as "Who? When? Why? Where? What? How? How much? With what results?" (Strauss & Corbin 1998). This can include questions about Temporal issues (frequency, duration, rate and timing), Spatial Aspects (how much space, where, open or closed), Technological, Informational, and questions about rules, cultural values or morals and standard (Strauss & Corbin 1998). This analysis tool provided ongoing consideration from the initial coding through each iteration of the analysis.
- Analysis of Word, Phrase or Sentence (Strauss & Corbin 1998). During analysis within coded concepts, various words began to imply the same meaning, for example 'developer push back', 'off-the shelf product', and 'developer resistance'– all referred to the underlying issue of technological constraints.
- The Flip-Flop Technique – 'This indicates that a concept is turned "inside out" or "upside down" to obtain a different perspective on the event, object or action. In other words, we look at opposites or extremes to bring out significant properties'(Strauss & Corbin 1998). This flip-flop technique was used to help compare and contrast concepts, including consideration ofwhat was being said in an interview, in light of other interviews to reveal the existence of the same concept.
- Systematic Comparison of two or more phenomena – 'This means comparing an incident in the data to one recalled from experience or from the literature'. The comparative concept might be 'close in' (similar) or 'far out'(Strauss & Corbin 1998). The initial set of concepts (Appendix F and G) revealed many concrete issues, but a comparison of the

summary of each concept (memos) allowed comparing and matching to review high-level concepts.

- Waving the Red Flag – 'One of the indicators of bias intruding is the face value acceptance of the words or explanations given by respondents or the complete rejection of these without questioning what is being said. Whenever we hear the terms *always* and *never*, these should wave a red flag in our minds'(Strauss & Corbin 1998). This was not often found in the transcripts, but in the occasions it was highlighted it can be shown that key concepts in themes, including usability mindset and collaborative approach, factored heavily because this is where usability practitioners felt strongly about an aspect of their discussion.

These various techniques provide an opportunity for the researcher to engage with the data. Even the transcription of the audio to text allowed the researcher to engage with data. It is an important part of a qualitative analysis of the data that the research 'study and re-study the raw data to develop detailed, intimate knowledge of the data'(McMurray, Pace & Scott 2004). This researcher transcribed fifteen interviews (the other six were transcribed by a professional transcriber) of those conductedand performed various types of analysis (described above). The six transcribed by a professional transcriber still required reading, editing and engagement with the text. Transcribing enabled the researcher to engage with the data more deeply, leading to a closeness/intimacy with the various interviewees and what was said.

The importance of concepts or themes within the topic area of this research can be quantified by the number of times a theme is mentioned by the usability practitioners interviewed. McMurray et al. (2004) describe this 'quantification of themes' as a way to focus on the frequency with whichsome of these ideas were discussed by participants. This research has examined the frequency with which usability practitioners have uttered various concepts, in order to gain an understanding of the hierarchy of significant concepts. This is not the only level of significance considered for concepts, for example, concepts discussed by some of the more experienced usability practitioners highlighted the importance of a concept increasing its value to the thesis.

A comparison of themes among the various concepts will also provide a higher ordered analysis (axial coding). And, further examination and analysis of relationships among the themes and concepts have led to the building of theory (selective coding). This higher order analysis was supplemented with memos written during open coding. These memos provided the thoughts and ideas of this research at the time of coding.

3.7. Qualitative Research Tool

In order to aid in handling the vast amount of rich data gathered from the practitioner interviews, a tool was purchased and used. This tool is developed and provided by QSR International (2011) and is called NVivo. The QSR International website promotes NVivo as a tool to be used by anyone who wants to examine or make sense of information. They designed it for use by researchers, academics, forensic scientists, psychologists, tourism managers, sociologists, consultants and students around the world.

The computer can assist in the analytical process of a qualitative analysis method, such as grounded theory, because of its capacity to store, sort, match, and link data. It can provide invaluable assistance to the researcher in answering the research questions from the data, without losing access to the source data. NVivo supports analysis of qualitative data by (Bazeley 2007):

- Managing data
- Managing ideas
- Querying data
- Graphically modelling
- Reporting from the data

Using this tool does not ensure rigour in qualitative research. The grounded theory analytical process, described in this chapter, is the key part of rigour and validity in producing good theory. This tool allowed the analysis of the data collected to be done in a more organised, systematic way and provided more opportunities to engage with the data, concepts and themes developed. The efficiency obtained by using such a tool enabled better analysis to be performed, which provided flexibility when analysis needed re-coding or re-examination. Engagement with the data improved the research understanding of the emerging concepts.

The literature has a mixed response on the usefulness of using a tool such as NVivo for the analysis of qualitative data versusdoing it manually. It allows interrogation and analysis of data at a particular level, allowing engagement with the data, and the derivation of impressions and concepts from it. ‘The searching tools in NVivo allow the researcher to interrogate her or his data at a particular level. This can, in turn, improve the rigour of the analysis process by validating (or not) some of the researcher's own impressions of the data’(Welsh 2002).

In the early stages of analysis a computer-aided tool can help make sense of the huge amount of data collected and the complexity of analysing it. 'It was shown how patterns in the data were identified and "took shape" in the early, "coarse" stages of analysis' (Thompson, R 2002).

The tool itself does not replace immersion in the data, reflection and analysis by the researcher. It simply facilitates organising and sifting the data to enable the researcher to perform the inductive analysis, using the research interpretation of the data. 'The intellectual work of actually conceptualizing can only be done by the brain of the researcher. The computer may be able to assist, but there is a risk of becoming so concerned with the technical aspects that this interferes with the "artistic" aspects'(Webb 1999). Given the technical skills of the researcher this was not an issue.

It is suggested that the first time that a novice researcher does a qualitative analysis that they perform it manually, but on a small set of data (Thompson, R 2002; Webb 1999). On the other hand the expertise the research brings to the tool usage has an impact. 'The nature of the role that computer software can play is a function not only of the inherent properties and capabilities of the software itself but also of its use by the researcher' (Morison & Moir 1998). This researcher is highly computer literate and found using the tools for the open coding very beneficial, because of comfort, skill and experience with computers(Webb 1999). To develop the themes and relationships for emerging theory, data (and summary data) was exported from NVivo into Excel(Microsoft.com 2011) for further comparison and analysis. NVivo's function set provided some reporting tools that helped compare and contrast data and enabled discovery of relationships within the data. But, it was not adequate enough to allow for some comparative analysis that this researcher wished to perform, including comparison of summary data that was produced from multiple NVivo reports. In addition to supporting the analysis process, Excel was used to help format the data into tables that were inserted into the thesis appendices (i.e. Appendix D, E, F and G).

3.8. Qualitative Interviews

The interviews performed as part of this research are in-depth and open-ended directed questions. Rubin and Rubin (2005) describes this type of interview as an interview that focuses on 'what is socially approved, listen for and discuss that are specific to a group or setting, and examine what people have learned through experience and then passed on to the next generation'(Rubin, HJ & Rubin 2005).

Qualitative interviewing can have a narrow focus or broad focus, with emphasis on meaning and frameworks or events and processes. Rubin and Rubin (2005) describe the type of interview performed using two dimensions, for example, a Quantitative Interview which is between narrow and broad focus and will emphasise mainly meanings and frameworks may perform a theory elaboration interview. Another example is a narrow focus on events and processes that will require an investigative interview. This research focused on the narrow focus qualitative interview which will investigate stories of IS projects in which the participants have been involved, where the usability outcome is good and where it is poor.

The interviews are an extension of ordinary conversation. The participants take it in turns to talk as in normal conversation, but the researcher listens to answers and formulates meaning from what is said, which is beyond ordinary conversations. Understanding whose turn it is to talk is important, because interruptions are impolite. Focus should be limited to the topic, the researcher should be seeking 'thick description'(Rubin, HJ & Rubin 2005), i.e. detailed accounts, in-depth and focused. Characteristics of in-depth qualitative interviews are that it has an interpretive philosophy in relation to the analysis of the interviews.

A problem with in-depth interviews as the primary source of data for this research is that they are 'subject to the same fabrications, deceptions, exaggerations, and distortions that characterize other conversation'(Taylor & Bogdan 1998). It can be argued that this research is not a sensitive topic, not personal in nature, but is about one's professional workplace and any distortions or variation has been minimal and only impact on recollection of exact details, which is not the primary focus of this research.

As interviewees, the usability practitioners were partners in this research. They shared their experiences for this research work, which has guided the research outcomes from the data collected and the meaning they have given from their perspective. Rubin and Rubin (2005)discuss the role of the interviewees or informants or conversational partners. The latter word best fits the role of the interviewee. It emphasises that each person is unique and each interview with each interviewee is a unique one. The interview partner will have their own distinct knowledge and their own interaction style.

In order to discover the critical issues impacting on the usability outcome, this research has gathered data from usability practitioners in industry, using qualitative interviews. During each interview four open questions were asked. Open questions have been structured as broad or general questions that will simply indicate a topic to be discussed.

The initial questions for each interview conducted duringthis research included:

a) Describe your academic background and work experience as a usability practitioner

b) Describe a typical day's work as a usability practitioner.

c) Describe a project, that you were involved in, where the usability outcome was good (good story).

d) Describe a project, that you were involved in, where the usability outcome was unsatisfactory (bad story).

The two stories described and discussed by usability practitioners provided the rich in-depth data analysed in this research. These stories enabled the elicitation of in-depth data that provides the usability practitioner's perspective of what worked and did not work while performing usability activities within a project. This will enable a determination, from a good and bad perspective, what has a significant impact on an IS project's usability outcome.

During each interview, this researcher asked other questions to clarify points made by the practitioner. Also, at the end of each set of questions the practitioners were asked to compare the results of the two stories, discussing what was done well or not so well. This provided deeper insight into the practitioner's perspective on what elements impact on the performance of usability in a project.

After the eleventh interview, the following additional questions were asked to clarify the emerging topics:

- Organisational vs. consultancy based usability practitioner, what's the difference?
- How prevalent is the need to evangelise usability activities?
- Do conflicting usability goals occur?
- Importance of stakeholder involvement (user, developer, and business)?

Each practitioner's interview was transcribed into text. The questions posed by the interviewer (the author of this thesis) and the interviewee responses were all captured, in verbatim. The pauses and other emotional aspects of the interaction between interviewer and interviewee were not captured, as they were not believed to be of significance for this research. This formed the basis of one of the major data sources for this research.

The twenty one interviews took place in various locations which were most convenient for the practitioner being interviewed, usually their office or a quiet place outside their office

environment. The interviews ranged from 30 minutes to 80 minutes in duration, on average it they were 45 minutes per interview. The interviewees were from a broad range of companies across Melbourne, Canberra and Sydney. A summary of these details can be found in Appendix C in Table 7-2.

3.9. Conclusion

Qualitative research does provide a richer data set. Because of this richness, the meaning and more detailed understanding of the context of the situation can be ascertained. In this research the interpretation provided offers explanation for conclusions made. But it still boils down to this researcher's interpretation of the rich data set obtained. The meaning placed on text has been done with the inherent bias the researcher brings to the research. This does not mean it is wrong, but it does present a limitation in the research plan.

The research process/design is a key part of the activity of research. It provides the foundation on which the various sections of this thesis are built, and provides a research outcome that contributes to the body of knowledge. The process provides the rigour and validity needed in research work.

This section describes precisely what steps have been taken in this research work. In summary, Eisenhardt's (1989) research plan has been used to guide the research. This plan has been augmented with a grounded theory analysis methodology (Glaser, Barney G & Strauss 1967). The research work is based on data from industry usability practitioner interviews that have been enfolded with the academic literature.

In summary, 'grounded research enters the fieldwork phase of a project without hypotheses. The researcher describes what is happening, and provides explanations for why events occurred'(McMurray, Pace & Scott 2004). This research does not try to identify all the usability-engineering processes that should be performed to enhance usability outcomes in projects. It does try to present the influencing factors that impact on the usability outcome of projects, from a usability practitioner's point of view. To this end the methodology provides a clear and rigorous process to reach the conclusions of the research.

The following chapter (Chapter 4) will describe the findings for this research, which will mainly include open coding concepts and related themes. Included is the frequency data of how many interviews discussed the concept/themes, along with the number of utterances for each

concept/theme, discussion about utterances were said theses during the interview (which questions) and the weight some comments carry due to the experience of the interviewee. These themes have been later analysed (Chapter 5) to develop the theory, compare the findings with the literature (Chapter 6) and then answer the research question for this research in the conclusion (Chapter 7).

CHAPTER 4

4. Findings - Usability Practitioner Interviews

As discussed in the previous chapter, the researcherhas conducted a qualitative study, based on data obtained through open-ended questions, during usability practitioner interviews. The interviews withusability practitioners consisted of various open questions (as described in Section 3.8) andthere were some additional questions added after a number of interviews were analysed. The analysis process, aided by a software tool, NVivo(QSRInternational 2011), enabled a structured and comprehensive analysis (as described in Section 3.6). This chapter will present and discuss the data gathered from the twenty-one interviews with usability practitioners. The concepts derived from the interviews and supporting statements made by practitioners are presented, providing the basis from which the key concepts were extrapolated. These concepts have been analysed (Chapter 5) and compared with current literature (Chapter 6).

In order to succinctly describe the results of the analysis performed by this research, the practitioners interviewed have been described, detailing various aspects of their background and experience. Then, each of the four final key themes have been used to group and present the final set of concepts along with samples of supporting interview data. These themes include:

- Usability Mindset
- Collaborative Approach
- Project Constraints
- Usability Practice

The initial coding categories produced a set of seven broad categories with fifty-eight subcategories (see Appendix G). These initial coding categories were used to search and analyse the interview transcripts. These initial categories were re-analysed to generate a more narrow set

of concepts that reflect various themes within the initially coded concepts. The result was approximately 180 broad concepts generated (see Appendix E) across initial concepts in the categories: stakeholder factors, practitioner issues, usability activities and organisational issues. Not all of the initial categories were coded as a concept, they were kept for later use to compare and contrast the emerging concepts in the analysis (Chapter 5).

The resulting broad concepts (see Appendix E) were examined individually, with the set of coded references (interview data) being re-examined. From this analysis memos were created to describe the essence of each concept. These concepts have been broadly derived from a more detailed set of concepts (see Appendix E and I) that were found within the initial set of open coding. The memos and a cross-concept matrix query (generated using NVivo), allowed similar (in perspective) concepts to be grouped into a final set of twenty-seven concepts. Appendix F shows this derived grouping of concepts for each of the twenty-seven final concepts.

This chapter will first discuss various attributes of the usability practitioners interviewed, used in the analysis in Chapter 5. Next, the final set of twenty-seven concepts have been discussed, grouped within the four themes (identified during the analysis). Each concept is also examined across the various practitioner attributes and across the interview questions from which it was coded(see Appendix C for summary). The presentation of each concept in this chapter includes a general discussion of its essence with supporting quotes from the interview data, a summary of its relationship to the practitioner attributes, along with a summary of how it contributes to the theme.

Strength	Sources
Very Strong	16-21
Strong	10-15
Moderate	5-9
Weak	1-4

Table 4-1: Inter-concept relationship strength legend, based on number of interviewees (sources)

4.1. Practitioner Attributes

The practitioner summary (Table 7-2 in Appendix C) table provides a snapshot of the usability practitioners interviewed as part of this research. These and other practitioner attributes have been discussed in more detail in this section.

The following section describes various characteristics of the usability practitioners interviewed. Some of these characteristics were used in the analysis of the interview data. The interviewed usability practitioners, as can be seen from the demographic data presented in this section, are a very diverse group of professionals. This is indicative of the usability profession, based on two survey studies conducted (Gulliksen et al. 2004; Vredenburg et al. 2002).

Sex	Number of practitioners
Male	13
Female	8

Table 4-2: Practitioner Gender

Gender is shown in Table 4-2, showing slightly more male practitioners were interviewed. This is discussed briefly later (Section 5.3.1) in the analysis chapter.

The context in which usability practitioners performed usability activities was an important characteristic to examine.Understanding the different issues impacting on organisational based practitioners and consultancies have produced some interesting results. Table 4-3 provides a summary of the practitioners interviewed from the context of practice. The 'Mixed' practitioners had worked in both an organisational environment and in a consultancy environment.

Context of Practice	Number of practitioners
Usability Consultant	8
Organisation based usability practitioner	7
Mixed	6

Table 4-3: Practitioner context of practice

The usability practitioners interviewed had two different roles within the usability area. This was either a usability management role over a usability team (which also involved performing usability activities) or a usability practitioner role (which involved predominantly performing usability activities). Table 4-4 provides an overview of this distinction in the participants.

Role	Number of practitioners
Usability Manager	12
Usability Practitioner	9

Table 4-4: Practitioner role

The diversity of the various academic backgrounds, in Table 4-5 and Table 4-6, not only indicates the multi-disciplinary nature of usability practitioners, but also agrees with the idea that the discipline of usability within educational institutions is in its infancy. Many practitioners commented on wanting to do an academic program that focused on usability, human factors, ergonomics and HCI. One practitioner described it as 'An amazing diversity of people'. Working with this diversity provides an opportunity for practitioners to enhance their skills. One of the interviewed usability practitioner expressed this, 'The skillsets that they [usability team] brought along, I was able to work with many different people from PHD backgrounds through people who have been [company workers]'. The literature agrees with these statements of diversity in usability practitioner backgrounds (Gobert et al. 2002).

Undergraduate Program	Number of practitioners
Computer Science	3
Psychology	4
Commerce/Arts	3
Multimedia/Graphic Design	4
Industrial/Mechanical Engineering	1
Information Technology and Information Systems	2
Economics	1
Accounting	1
Others unknown	2

Table 4-5: Academic Undergraduate degree

Graduate Program	Number of practitioners
Graduate Diploma Applied Information Systems	1
Master of Science (Human Factors within HCI)	2
Graduate Diploma Ergonomics	1
Graduate Certificate in Human Factors	1

Table 4-6: Graduate Diplomas, Masters and PhDs

Not all interviewed practitioners had done academic study. Some had started their working careers within an organisation, having been subject matter experts (users), and moved into a usability role through opportunities within the organisation. Some of the practitioners expressed an interest in doing graduate diploma studies within this area, but there was nothing on offer that focuses on this area. The broad age range of the usability practitioners interviewed can be seen in Table 4-7.

Age Brackets	Number of practitioners
Under 30	6
Between 30 and 50	12
Over 50	3

Table 4-7: Broad Age brackets of practitioners

All the usability practitioners have worked for more than five years in the usability area and all are currently working in Australia. Usability practitioners interviewed were located in Sydney (three), Canberra (two) and mainly Melbourne. The experience of a practitioner, shown in Table 4-8, has been broken up into those with ten or more years of experience and the other with less than ten years experience. In the analysis chapter the significance of this issue have been discussed (Section 5.3.4).

Band	Year of Experience bracket	Number of practitioners
Low	Between 5 and 9 years	8
High	10 years and over	13

Table 4-8: Usability Experience of practitioners

The interview sessions were predominantly performed at the interviewee's workplaces and were between 35 and 70 minutes in duration. The interview sessions were recorded, audio only, and then transcribed into text. The above data was predominantly drawn from interviews, but where gaps were found they were filled by examining the usability practitioners 'LinkedIn' page (linkedin.com 2011), a professional's online resume website. Each of the usability practitioners interviewed either requested to link to this researcher or this researcher requested a link to them,

after or before the interview sessions[8]. This provided additional information about the usability practitioner's experience and background.

4.2. Project Stakeholders

The term 'project stakeholder' has been used a lot in the discussion of the various actors involved in a project to describe various concepts presented in chapter 4 and chapter 5. An analysis was done of the interview data to discover the various stakeholders involved in the performance of, and affected by, usability activities. During the analysis of this data the following stakeholder groups were identified:

- Primary user of theIS being created

  'Users are mostly case workers. They're the most important user, because they have immediate needs often, they can't over emphasise that, because it really influenced the design.' #01

- Multiple user groups with various needs

  'Our users are the consumers of our site and the advertisers of our site and those people have equal needs or roughly equal needs and we need to be designing for those needs.' #05

- Software and hardware vendors

  'The software vendor response quite often is we can't do that.' #11

- Business Analyst

  'The lead business analyst who became the usability champion on the project did a lot of stuff with me.' #08

- Project Manager

[8] The act of accepting an invitation to be linked to a usability practitioner's LinkedIn professional account has filled in gaps and provided additional information about the practitioner's background.

'We had a really good well defined working relationship with the rest of the project team, with the developers, the BAs, with the project managers and the business bosses.' #01

- Developers

  'We sat with the developers we actually had a very very good view over the technical constraints and the types of things that need to be considered.' #07

  'We always used to get a developer from our sister team to come in and sit down and run through the actual session.' #14

- Senior project sponsors

  'Get a senior project sponsor on board, with the project. So, that way we have someone who has some clout in the organisation, helping drive the project and supporting the project.' #10

- Legal team is an example of a surrogate user that can have an impact on a project

  'We got swamped by the legal team.' #02

- Usability practitioner's involvement as an organisational usability practitioner
- Usability practitioner involved as an external usability consultant.

  'Have it written down by external consultants because we have been saying this thing internally for a long, and no one's listening to us because we are internal people.' #11

There were interesting comments made about usability practitioners as liaisons or bridge between departments in an organisation. Usability practitioners become, or enable, a conduit between the various stakeholder communities for communication of the shared usability vision. Usability activities provide an opportunity for involvement in usability and enable communication between stakeholders groups.

'I was also there to sit between the technical staff and the business staff and help them talk to each other.' #10

'People in different divisions and you tend to find in, especially in financial institutions, there are barriers between the divisions, they do not speak at all, they throw things over the fence basically. So, I think we are kind of the glue, but we are also the bouncing board, everyone just goes to us and we just bouncing it over to the next people.' #17

In summary, this research has allocated project stakeholders into four distinct groups:first, the *IS project team members*, which can include the project manager, business analyst and developers; second, the various *organisational stakeholders* that provide their support or business goals to the project, which can include the senior project sponsor, organisational units (such as legal team, human resources and/or quality assurance people) and senior management; third, the *primary users*of theIS being developed to solve a business problem; fourth, the *usability practitioners* involved in varying capacities to perform a usability activity at specific intervals in the project lifecycle or be involved from end-to-end to improve the usability outcome for the project. This last group can be broken down into two groups, organisational-based usability practitioners or external usability consultants. A summary of these distinct project stakeholder groups has been shown in Table 4-9.

Project Stakeholder Group	Stakeholders
IS project team	Project manager, business analyst, developers
Organisation	Senior project sponsors, organisation functional units (e.g. legal team), and senior managers
Primary Users	Actual stakeholders who have been using or a directly affected by theIS.
Usability Practitioners	Organisational usability practitioners or usability consultants

Table 4-9: Project Stakeholders

The outcome of this section, in relation to project stakeholders, is that they (the project stakeholders) are the primary resource for usability practice. Project stakeholders need to be taken on the usability journey, be involved in usability activities and given the opportunity to develop a usability mindset for the project that incorporates their domain knowledge and expertise. This is not limited to the IS project team members, the collaborative approach applies to all project stakeholders. This involvement and consideration of project stakeholders in usability activities will have a positive affect on the usability outcome for a project.

4.3. Usability Mindset

The following set of concepts describes the importance of a usability mindset, achieving a usability mindset and maintaining a usability mindset for an IS project. A usability mindset describes the different levels of usability understanding across the various project stakeholders

and within the organisation. The usability mindset, once adopted, would allow decision makers within the project and organisation to give due consideration to the usability concept, which would provide a consideration and balance of the usability goals. The usability mindset will be nurtured by making usability issues real and by project stakeholder involvement in usability activities. This, along with creating and following usability requirements that have articulated a set of usability goals, should be considered during performance of usability activities and used in the promoting of the usability mindset.The attaining of a usability mindset can extend decision making to include usability. The concepts that form part of this theme include:

- Create and follow the usability requirements
- Nurture usability understanding
- Making usability real to create a shared vision for project stakeholders
- Project decisions embrace a usability mindset
- Usability goals promote a usability mindset
- Usability maturity requires transformation of the organisational culture
- Usability activities involvement enhances usability mindset

4.3.1. Create and follow the usability requirements

The essenceof this concept is that usability requirements need to beelicited and articulated early. This will enable usability requirements are considered and/or incorporated in a project plan. In order to promote the following of the usability requirements, educating and communicatingwith all project stakeholders can improve adherence to them. The value placed on the usability requirements by the IS project team members and senior organisational stakeholders is important to the acceptance of the usability requirements. Often project constraints, such as technological constraints or vendor constraints, can impact adherence to the usability requirements. Therefore, usability requirements need to be documented as a usability mindset memory for usability activities and decision-making throughout a project lifecycle for reference by all project stakeholders.

The usability requirements are shaped by the analysis and research done during the initial stages of a project. The gathering of this analysis is usually done through interviewing stakeholders or observational techniques. This often reveals key usability goals (optimally four to six for a given

project) from the various stakeholder groups, e.g. users, organisational, and developers. This analysis and research need to be presented back to the stakeholders, to validate the usability requirements. It also allows concordance of any conflicting usability goals.

> *'When we are starting a project we talk to the key decision makers around the product itself and we talk to the stakeholders, we have a framework of questions within which we operate, where we talk to what their expectations are, what the problems are, what the potential solutions are, where they see where our potential customer pain points are etc, etc. We build up that knowledge. We then analyse all of that information; we almost treat it as customer/user data in that respect. We analyse it and present it back to them and say, "this is what we have heard from your twelve people over the course of the last two days; this is the premise we are operating on;, if anything is completely out of place, say so now, or forever hold your peace". So we actually have all that documented up front.' #02*

Following usability requirements needs usability education and effective communication to project stakeholders. This provides usability direction and the basis for usability decision making for the project.

> *'Educate the business owners. They are the ones who typically make the decisions, they're the ones who get the budget, they're the ones who determine the product timelines. Educate them first, otherwise by the time it gets to usability, it's too late, you're dead in the water; it's gotta happen a lot sooner.' #21*

Following the usability requirements helps focus onthe various usability activities performed throughout the project lifecycle. This usability memory is often provided through a living document, which presents the usability goals and requirements for reference by the entire IS project team during a project's lifecycle.

> *'[when doing design activities] I covered all the objects: do I have a sense of what people are working on, what tasks are they doing? Then I allocate those to the grouping, in order to work through the screens themselves. Eventually all that stuff has to end up on a screen somehow. It has a line of sight back to the requirements, so it would, in a sense, iterating through reading the requirements set and transferring that to design, checking generally overall if I am achieving piece by piece the entire application.' #17*

> *'Typically at the end of the analysis phase we would write a report, we would get all that stuff [usability requirements] down, out of our head, on paper.' #10*

Usability requirements need to be taken seriously and given equal standing by the project stakeholders, especially the IS project team. Often vendor pushback on changes, due to technological limitations or software upgrade risk, leads to limited adherence to usability requirements. This vendor pushback needs to be considered when negotiating and selecting a software vendor to implement the system for an IS project. Usability requirements can take a back seat when a project team is in the process of selecting a software vendor to implement the system. Knowing the structure of the software product to be selected can help understand whether it will be flexible enough to adhere to the usability requirements for the project and beyond. Usability requirements must be brought to the attention of project stakeholders to ensure adherence to them when usability decisions are encountered throughout a project lifecycle.

> *'We were involved in the vendor selection but our voice was not heard, so there was our first problem. So, even though our usability people had explicit requirements around things like being able to customize, being able to work, even when vendor is inflexible, we were overruled by a number of technical and business criteria, which were deemed to have higher value. And so we were to work with a vendor that we had some concerns about.' #06*

This concept was discussed by eighteen of the usability practitioners and generated fifty coded references. There were nine practitioners who discussed this guideline during the typical day discussion, seven during good story and nine bad story discussions, three during general discussion and two during the question of usability evangelism. This highlights a well-grounded concept, discussed strongly by the majority of usability practitioner from this study.

The creation and adherence to a set of usability requirements is a key initial concept for the usability mindset theme. It provides a living usability document that becomes the usability memory for the project. It allows project stakeholders to gain an understanding of what usability is for a given project.

4.3.2. Nurture usability understanding

The essence of this concept is that the promotion and improving of usability understanding throughout a project lifecycle is an important role. It's about understanding the various usability elements that add value to usability for the project and promoting them. These elements may include: what usability is for a project; articulating the usability goals and requirements;choosing

the most appropriate usability activities and being flexible in their performance, examination and reflection on the usability findings and their implication for the usability goals. Incorporating various perspectives into the usability requirements may have an impact on the usability understanding,these perspectives may include the project stakeholders, organisational issues and/or project constraints. It is important to nurture this usability understanding to gain usability credibility by project stakeholders and reduce resistance to it.

The promotion of usability understanding can be evangelised or based on an established track record of successful usability outcomes. Understanding of usability can be done through articulation of usability goals and requirements, performance of usability activities and the understanding obtained through usability findings.

> *'One of the things we were trying to do was basically getting each of the stakeholders that are going to be involved at Stage X and bringing them right up the front and explaining everything that we are doing and getting their buy-in and feedback earlier on.' #02*

Promotion of usability understanding comes through a focus on tangible benefits and getting 'usability runs on the board'. Involvement by IS project team members and business stakeholders in more that one project, where usability is implemented as a concept, can lead to better usability understanding and improved insight into the perceived usability value to the project.

> *'Even though we can't achieve what we want within the first project, because within the organisation, we see these people all the time. So the next set of projects that come around, you see the same lot of people running it, and because they're starting to get the idea of what we are trying to do, it means that next time around it's a lot easier to do the balancing of the user and business goals.' #20*

Involvement of project stakeholders in performance of usability activities enables usability understanding. This is especially important for IS project team members and organisational sponsors. When stakeholders are involved, it is important to keep the language simple and understandable to maximise the usability understanding attained through the involvement. This usability understanding is achieved by making it real for stakeholders through involvement.

> *'…through the work we are doing with our stakeholders they have now got an appreciation of the value of design so, in theory, you could blow away our team but you would still have stakeholders saying,"you know, we need to do our design".' #05*

'…what we have found is that we have worked with those stakeholders in different ways on different projects so they are all probably at different levels of their understanding and appreciation. So, for some we are still, like, evangelising and for some, they wouldn't consider doing a project without involving us.' #05

Improving usability understanding with key organisational sponsors can lead to an improvement in the project constraints, such as time given and monies allocated to usability activities. If additional time is needed to act on usability findings from usability activities performed, that may require further design activities. This needs to be given more prominent consideration in project, which can only be achieved through usability understanding.

'Sometimes when we talk to the key business people, the money crunchers, they don't see why spending money, delaying the project another month, just to fix up the user interface a bit to make it more user friendly, "that's just cost us money, people can use it now, people can actually complete a task".' #18

Sometimes usability understanding for project stakeholders can only be achieved through usability education. This education can help incorporate usability throughout a project lifecycleand improve the stature of usability within a project. It can enable better selection of which usability activities to perform during project lifecycle, or allow better understanding of the usability findings generated. Education helps establish a usability mindset that shapes the organisational culture and leads to better usability decision-making. Usability education is a key ingredient in usability understanding.

'It's part of our education process, to meet with them and discuss the amount of work we can do for them in the project. We try and identify the accessibility and usability requirements, and try to explain to them why they should be considering it.'
'It's a gradual education process.' #20

Project stakeholders are required to understand the flexibility needed with the performance of usability activities, to enable maximising the usability findings. Usability activities are not simply a bunch of techniques that must be done in a given sequence or even as specified by an organisation's process or project plan.

'So the PMs (project managers) have been taught this is what has to be done at certain times and problem and the balance is that we can start saying that "in this project we going to do this and this, and this for this reason". You may get this mentality that it maybe is not crucial, that we do the whole lot then, or we don't have to do this one. It's

that whole balance between how flexible can you be and understanding enough to explain why you are taking that step.' #20

Sixteen usability practitioners within sixty-one coded references discussed this concept. This concept was discussed throughout the entire set of questions during the interviews, but predominantly during the typical day discussion (eight practitioners) and good story discussion (nine practitioners). This concept has a strong base of support from practitioners interviewed.

The nurturing of usability understanding is an important aspect of the usability mindset theme. It is the cornerstone of introducing, improving and promoting usability understanding. Improving project stakeholder's usability understanding is done through making usability issues real and through involvement in usability activities. Education and evangelism can also be used to promote usability understanding. Flexibility of usability activities allows for maximising usability understanding. The usability mindset of project stakeholders for project and organisation is improved through usability understanding.

The level of usability understanding among project stakeholders, project teams and organisations can be progressed through the following categories:

- No understanding;
- Done as part of a project lifecycle or limited usability advocacy;
- Allowing stakeholder to see the usability value;
- Articulation of usability as part of a project's shared vision providing a project usability mindset;
- Transferrable usability mindset across all projects and within the organisation**.**

4.3.3. Making usability real to create a shared vision for project stakeholders

The essence of this concept is that making usability issues real to project stakeholders can have a significant impact on the creation of a shared usability vision for the project. Usability practitioners can use this real evidence and present it in discussion to aid in usability decisions. Project stakeholders can participate or observe usability activities in order to allow a project-

shared vision to be established. A usability document should be used to maintain the evidence obtained during the project as a usability memory for project stakeholders not involved, or engaged later in the project lifecycle, to attain the shared usability vision. Establishing and fostering project stakeholder relationships is a key way of gaining involvement that can aid in making usability real to them. A usability champion is needed to help make usability real to the other project stakeholders, especially when a usability practitioner is not present throughout the project lifecycle.

Creating a usability mindset within an IS project can be approached from many perspectives, one of the most effective ways is through activities that make the concept of usability real to project stakeholders. Physically performing the observation of the user environment provides real evidence of what is currently happening with the system, whether it's the old or new system. This real evidence can provide credibility later in the project lifecycle, enabling better usability decisions to be made.

> *'I wouldn't suggest for a moment we did all these site visits and had this revelation; not by any means. But having done the research we had good evidence…we had credibility because we had been out there in the field watching them do the work. And we ran design sessions with represented users, etc. etc.' #01*

Stakeholder involvement in observing or participating in usability activities engages them in the usability process and makes the usability issues real to them. Making it real through observation is the best way to improve the shared usability vision.

> *'They have to say it. They say it, so they'll own it. "Oh, wow, you're onto something there; god I have been trying to convince you guys for six weeks, this is what it is, you have finally said it yourselves!" Then I can say it all I want, but it's the skill in showing them, exposing what lies beneath, and letting them make that final statement, "god this sucks".' #17*

> *'Had this really good board, who were going to be the sign-off people, and what we did was, very carefully had fairly regular meetings, so fortnightly was the longest, and they did not have to be long meetings, but every meeting we would present them something we had learned. We would either talk to them about what had come out of user research, or we would talk to them about where we were up to thinking about the structure, or we would talk about what our next steps were. So that every time we talked to them we were pulling them along a little bit with us.' #19*

The development of a usability document (incorporating usability goals and requirement) to help share the usability vision, should attempt to provide the reader with a sense of realism, with examples and descriptions provided. The usability activities performed and usability findings generated should be documented to provide real evidence of usability issues. This is especially important if you're a usability consultant, involved for a short period, it's the main avenue to creating a virtual shared vision for the entire project lifecycle.

> *'The ownership, the design; again I could go off and design the best thing in the world with the users and run sessions and whatever else. And then write up a beautiful design document, explain how it works and whatever else, but if the people who are going to implement it and own it don't have ownership of the vision and an understanding of why it is the way it is, then its less likely to be implemented in the way it needs to be or it is intended to be.' #08*

Making usability real to project stakeholders can highlight and help resolve conflicting usability goals. It enables establishment of a shared usability vision that can be used to concord and balance the conflicting goals for the project.

> *'Conflicts, or conflicting, is beautiful in our eyes because that means we actually have found within the stakeholder set conflicting views. We bring them to the front and say "hey guys, when we talked to you this is what we heard; these are conflicting views and we need direction here". Well, we need to make sure that we are all on the same page. It is part of the process to isolate this.' #02*

> *'If, for some reason, the design is to change because things do change as you hit implementation, the scope might change a bit. There is a technical issue; whatever else. Then if they don't know where the vision comes from and why it is the way it is, the rationale of the design, then they are not in a good place to then work out what are better and worse solutions to that to meet the change.' #08*

Making usability real, creating a shared usability vision, is difficult to do without establishing and developing relationships and communication with all project stakeholders. This is often done through involvement of a usability practitioner throughout the IS project (consultants are usually involved for a limited time frame) or regular meetings.

> *'The realization that to change a corporate culture, to embrace user centered techniques and see the competitive advantage of user experience work, you need to be present in that company everyday having those conversations with those people and taking people down*

that sort of design path. You know its probably, I think, it is less effective to do that as a consultant because you are there for a limited time and you are kind of a specialist. You are not building the relationships that you need to effect that change.' #05

The analysis found that it was important to have a usability champion who owns the usability project vision and makes it real to project stakeholders. This ownership of usability vision in a project team, often by a IS project team member, takes a lead role in the usability activities, helps propagate usability across all project stakeholders. The best members to have become usability champions are the Project Managers or Business Analyst, especially when a usability practitioner is not involved.

'If the people who are going to implement it and own it don't have ownership of the vision and an understanding of why it is the way it is, then its less likely to be implemented in the way it needs to be, or it is intended to be.' #08
'You need to have someone who owns the usability function, Number one, the usability design and the usability function and who is the champion for it, who is sufficiently placed within the project to have clout and whatever else, to be listened to and actually has the time and space to make sure things happen rather than being one of twenty hats that they wear. And that person needs to have a good and thorough understanding of where the design has come from.' #08

Making usability real to project stakeholders can help sell the concept of usability by involvement and/or observation in usability activities. This provides an opportunity to sell the concept of usability and its related activities that can help build the shared usability vision.

'I think that form of usability testing and allowing people to observe it really sells itself. Because people, they can see when people – it's one thing to just say "look I'm a professional and this is something I think people are going to have trouble with" and people might go "oh yeah, whatever". But when they actually see people really, really struggling or really frustrated, where you can see it in their face and their vocal mannerisms coming out – it's just that kind of, "oh my goodness".' #14

There are eighteen usability practitioners who contributed to this concept, with sixty-five coded references. This concept was mentioned during all questions, but predominantly in the discussion of the good story (ten practitioners). This concept has a strong base of support from practitioners interviewed.

This concept provides the usability mindset with the key way of improving the usability mindset, which is through making it real in order to improve the share usability vision for the project. This is being done through involvement in usability activities and generation of a usability document for reference throughout project lifecycle.

4.3.4. Project decisions embrace a usability mindset

The essence of this concept is the importance of a usability mindset to help make better usability decisions. The usability mindset is beyond understanding the value of usability and beyond understanding the shared usability vision for a given project. The usability mindset is where usability has been integrated as part of the organisational culture and is considered when making project decisions throughout a project lifecycle.

Creating a usability mindset for a project is a key element to improving usability decisions made throughout the project lifecycle.

> *'It's educating. It's telling them. Evangelising is normally about selling the idea of usability, and I was selling the things that they needed to understand to make good decisions. So by the time they got there, they didn't undo our good work, by making decisions that are not informed.' #19*

Usability practitioners can improve their experience and understanding of other domains when performing usability activities. Other stakeholders provide their experience of the business domain or technical issues. This sharing of expertise enhances the usability mindset and leads to better usability decision-making. This experience provides usability practitioners with insight to the usability mindset required for a given project. Usability practitioners may not have expertise in the business domain but bring usability understanding and experience (usability mindset) to support usability decision-making.

> *'That's what comes with development and time and expertise, is being able to sell that and take people on that journey. I tell it as it is, [look to get other stakeholders to say it; if they say it they will understand it]. As long as I don't say it, if that makes sense.' #17*

Usability measures provide hard evidence that can help shape a usability mindset, which can improve the usability decision-making for a project. For example, being able to utilise usability measures from usability activities can aid in, for example, the acceptance of a change in a design element.

> *'When you're dealing with people who are extremely creative, they can have a real attachment to a design element, so if you can show them pretty unequivocally that it was ignored completely by everyone that looked at the site, then maybe don't be so attached to that design element, or move, or it may need more work.' #17*

This concept has contributions from seven usability practitioners, with eighteen coded references. This concept was discussed in most of the questions asked during the interviews. This concept has a moderately strong base of support from practitioners interviewed.

The usability mindset theme has a high-level concept of usability understanding that enables project decision making to be done with a usability mindset. This is the most desirable level of usability understanding that needs to be nurtured. It may require hard evidence or very experienced practitioners to incorporate domain and technical expertise of project stakeholders to achieve a true usability mindset.

4.3.5. Usability goals promote a usability mindset

The essence of this concept is the articulation of usability goals[9] as a part of the usability requirements provides the heart of the usability mindset for project. These usability goals need to be done early in a project lifecycle. The usability goals need to consider the various project elements, such as the various stakeholders groups, project constraints and project lifecycle. The usability goals[9] will often be found to conflict and require balancing or prioritising. Involvement by project stakeholders will aid in the elicitation and understanding of the usability goals and their concordance. A defined set of usability goals provides the basis for a project's usability mindset.

One of the aspects that shapes a usability mindset for a project is the set of usability goals, usually part of the usability requirements. These goals, which optimally number four to sixfor a given project, define what is meant by usability for a project. Articulation of these usability goals often incorporates goals for all of the project stakeholders (general includes the users, organisation and development issues). The setting of the goals allows a usability practitioner to gain credibility within the project, guides the practice and gives the focus to the usability activities performed throughout the project lifecycle. A project that does not set usability goals does not have any usability direction. If the usability vision is lost or has reduced importance in a project, this may lead to usability goals not being measured and not driving the usability activities in the project lifecycle. This impacts the usability mindset for the project.

[9] Usability goals can be either concrete or abstract in nature. Usability goals and usability attributes are often used interchangeably. Usability attributes usually relate to the definition of usability whereas a usability goal is a set of measure specified in the usability requirements/specifications. A concrete goal maybe the achievement of a specific measure of success based on time to perform a task or number of keystrokes to achieve a task. A more abstract usability goal may be a broad statement about, for example, upselling philosophy for an organisation across all other tasks, efficient design for expert users or learnability for novice users. Usability goals, usually number between four and six, provide the usability mindset of the shared usability vision for a project.

'Usually we say that you choose between four and six because too many waters down your focus and it would be too much to manage and so on. I don't typically prioritise them but we certainly do that from time to time and we have done it on projects.' #08

'Well, and see that's the thing I am quite strong on here now in my role, is this stuff all the goals, principles and relationship stuff. And it is important for two reasons: one is because it guides your practice and what your focus is and that kind of stuff, good stuff; and the second is that if you have got this kind of stuff going on and you act on it and say and you articulate it to your stakeholders, then you are more likely to be perceived as rational and therefore credible.' #08

The usability mindset needs to be maintained throughout the project lifecycle, which is defined by the set of usability goals. Usability goals need to be set as early as possible in the project lifecycle. These goals should be measured throughout the project lifecycle, during various usability activities. The usability goals need to be considered throughout the project lifecycle by focusing the usability activities to produce usability findings that monitor and measure the usability goals, and ultimately measure the usability outcome for a project.

'I think the problem is not if they agree to the goals really. A lot of times we have found that they don't measure them in the end. That's a problem. You set these nice little goals, and everything like that, then you come back to talk to the client the year after. "How are you going with the goals?" "Oh, we have forgotten to measure them".' #18

'So there were core bits of functionality and the project were very clear at the start of what our requirements, of what success was going to look like, what kinds of key performance indicators we needed to make to be successful.' #03

The various stakeholders involved in an IS project, especially the project team members, don't have a clear understanding of the usability goals specified in the usability requirements and they may not understand the usability activities being performed. The usability requirements may have been generated by usability professionals and provided as a usability document to be referred to throughout the life of the project, but may not be consulted! The results attained through the various usability activities performed may be alarming to the other project stakeholders, especially towards the end of a development process. Often a project team simply wants to tick the 'usability' box in the development process. They are not interested in acting on the usability outcomes.

'I had found myself a number of times (week or so) in that period saying, "but we have done this and it is in the design document". And the issue was that it was quite a long and extensive design document. It was, like, 120 pages or whatever it was, and it took a lot of blood, sweat and tears to create that. And that explains how to do things, but the understanding of what the vision really was and how things would work was in the document but for some reason wasn't being accessed, or whatever. And yet if this other guy, Tom, if he had been involved in my process all the way through, he would have been in a better place to understand that.' #08

The articulation of usability goals for a project when generating the usability requirements, invariably leads to conflicts between usability goals. The organisational goals are often most prominent in the consideration for usability goals in the usability requirements document. Usability practitioners need to present back the various perspectives behind each of the usability goals, along with their recommendations to the organisation or other project stakeholders, to enable a balance or concordance of the usability goals. This balance may result in a prioritisation or it may result in multiple interfaces to enable switching modes[10]. It may not always be the business and user goals that conflict, for example it could be other things like legal requirements, up-selling or technological constraints. The design phase is often where goals need to be implemented into a workable design, this is where conflicts are highlighted,as one of the interviewee described'design is essentially a series of trade-offs you need to work out'.This prioritised and balanced set of usability goals is done through involvement of project stakeholders and ultimately becomes a part of the usability mindset.

'Go back to your goals and work out how you can potentially meet both these needs. If they seem to be absolutely in conflict with each other, then one option is you literally switch modes. And so it's not unusual for a corporate website to have the majority of the site much more about our brand and image and then the shareholder's bit which has a change of tone. Which is what I have said…you change mode.' #01

[10] Mode is a term that refers to the specific interface and interaction style for a given design. So the term "switching modes" refers to having multiple designs that can be switched between. This is often done to satisfy significantly diverse uses in a primary stakeholder group, like expertise and novices.

'In that situation where we seem to have some conflicting advice we might look to the design goal and say, "hang on a second, can we prioritise these two seemingly conflicting designs"…. you got to get into design mode… well if this contradiction is so great do we literally go down the path of support both in two modes? There is no one answer.' #01

This concept has contributions from twenty usability practitioners, with one hundred and eleven coded references. This concept was discussed in most of the questions asked during the interviews, but predominantly in the bad story (eleven practitioners) and good story (nine practitioners). This concept has a very strong base of support from practitioners interviewed.

This concept highlights the importance and backbone that usability goals provide to the usability mindset. Involvement is required to aid in the elicitation, articulating and concording of usability goals that contributes to the usability requirements and development of a shared usability mindset for a project.

4.3.6. Usability maturity requires transformation of the organisational culture

The essence of this concept is that organisational usability maturity[11] requires transformation of the culture within an organisation. It requires the usability mindset to go beyond the value of usability, the selection of appropriate usability activity and beyond the shared project usability vision. An organisation with an internal usability team has a better opportunity to attain an organisational usability mindset. Usability consultants have the opportunity to improve the usability maturity in relation to acceptance of usability value to a project and the selection and performance of usability activities. They find it much harder to change the organisational culture

[11] Usability maturity refers to a 'usability capability maturity model' described in the glossary and discussed in the literature review (Section 2.5.4). It basically describes various levels of usability capability from bad to good practice, with intermediate or transitional levels.

to take on a usability mindset. Because an organisation does not embrace change quickly, a cultural shift needs to be done bit by bit.

Organisations must commit to a cultural shift to embrace usability. This commitment needs to go across the entire organisation in order to improve its usability maturity. Organisations that just do usability, because it must be done, will not get value from it unless there are changes in the organisational mindset at all levels across the organisation.

> *'It makes sense like we did it, deliberately; because I didn't want usability, or what we do, to be seen as that icing on the cake, which you can do if you want or not. But you know no-one says "will we engage developers on this?" Development is part of the process, so is design phase. You don't build something without designing it, well hopefully, you don't.' #05*

> *'The maturity of that organisation to understand the role that they needed to play; it felt a bit at times that, we are paying a consultant to magically produce this amazing web site and not really seeing okay. Well to do that we need to be involved in these parts and we also need to set up these continual processes to continue to evolve that.' #05*

Organisations and/or project stakeholders that are new to usability will need to improve their usability maturity in order to improve the project's usability outcomes. This usability maturity seems to be directed at three levels in an organisation: the organisations processes and culture, the stakeholder's usability understanding, and the utilisation of usability activities and their outcomes.

> *'It ranges from people who may not have heard what usability is, or understand what it is, to people who have heard of it and know they needed some but they are not quite sure what it is. Some user magilityor up to a range of people who understand what the different techniques are, then it's more a conversation about what to do. " #14*

> *'We have educated clients who will come to us and say we need a Heuristic evaluation done on a design. That's great and those clients are great. And sometimes other clients have not got a clue, and are very new to the concept of usability and we need to do a lot of hand holding and coaching along the way. They will come to us with a problem, like no one can find anything on the website or whatever it might be, and we'll help them identify the best solution to meet those needs.' #10*

An organisation that begins to understand the importance of usability can often establish an in-house usability team. The organisational maturity has taken a step in the right direction by simply acknowledging usability with the setup of an in-house usability team.

> *'We brought usability in house, that is, the lab itself. We were using IBM, and I invited the general manager down to have a look at what we were doing, and he asked "what are the problems associated with going off site?" So I explained to him if we have a landline failure or something's not working, contact of the technical experts in a reasonable timeframe. He asked, "how much would it cost to bring one in-house? I would like a proposal within the next 48 hours." So within 48 hours I gave him a rough guestimate of what we needed, and about two months later we had it in-house.' #12*

When the voice of usability is not heard, maybe due to a lack of trust, and the usability mindset is not present to aid in the organisation's decision making process, the wrong decision can be made in relation to the usability outcome achievable for an IS project. This demonstrates a low level of usability maturity.

> *'We were involved in the vendor selection but our voice was not heard, so there was our first problem … so we were to work with a vendor that we had some concerns about.' #06*

> *'The second time we work with a client, first of all they know how you operate and they have seen the benefit of using you before, so when you say something, "alright we trust you even though we don't fully understand the reason, we trust that this is the right way to do it." So trust is very very important, especially for a consultant.' #18*

Sponsorship at the highest levels in an organisation leads to usability being taken more seriously and ultimately improves an organisation's usability maturity. Senior organisational sponsors help gain organisational acceptance of usability that can lead to continuous improvement and optimisation of processes in relation to usability. Organisational culture change needs to change the perception of usability at all levels in the organisation.

> *'We were asked to deliver to their general managers, things like that. It percolated, and when you get to that level you start to be taken seriously. It was only two general managers in the end, but that's nothing to sneer at.' #17*

> *'We still get perceived as an end-of-cycle kind of team. Which is why we have a kind of education process to change the culture that we know and promote that this kind of work should be done upfront, and we have had very limited success with that.' #20*

An organisation's usability maturity can be low, even with an internal usability team. This lack of trust in usability may lead to employing external usability consultants to validate the internal usability team's findings and recommendations.

> *'Clients often come to us and want an external voice to say what they already know. From my experience talking to our clients who are internal usability people, sometimes, they don't get taken seriously, I would find that pretty frustrating.' #10*

> *'The people I am working for at the moment, I delivered a document to them last week. "We really have not learnt anything new, but it's great to have it written down, and have it written down by external consultants because we have been saying this thing internally for a long time, and no one's listening to us because we are internal people."I think that's kind of common.' #11*

As usability consultants you cannot build the relationships needed with an organisation to help it embrace usability concepts. Usability consultants need to use usability education to help improve usability maturity of an organisation. Internal usability practitioners can provide an open door policy for questions and advice. In relation to usability this can improve an organisation's usability maturity.

> *'It does need to have that whole organisation approach. That's one of the things as a consultant that we need to have skills in, is educating the client. So when we come across those situations, we can present the rationale for our design and explain why we have done it a particular way and get the organisation involved in the testing as much as possible.Because when the disbelievers see a testing situation and hear their customers saying "no I would go to the competitors", "no I don't understand that", or "no I don't like that". It's a pretty powerful sort of thing.' #10*

The better the traction that usability has within an organisation, the better the usability outcome that can be achieved. Small usability wins can help build up understanding and reputation and lead to better usability maturity. It can be quite difficult to enact a culture change, no matter how much usability evangelism is done. It may require a more stealth-like approach of getting small amounts of success on the board in a few projects before awareness and understanding begins changing the organisation's culture.

> *'We got massive accolades throughout all of Telstra, we had directors from the areas of the business that weren't related to us, who had been told by their direct reports, that there is this new thing had been launched and it was so much better. They looked at it*

and said it was faster and really easy to understand… [Lead to acceptance of usability value]' #21

Usability maturity may need evangelising, educating or selling to an organisation, but ultimately it requires organisational culture change. The appropriate usability mindset needs to be developed to enable usability concepts and activities to be integrated throughout the organisation processes and decision-making. This requires a change in the organisational mindset towards usability concepts that goes beyond a project.

- In order to change an organisation's culture, usability practitioners need access to all stakeholders of a project.
- Organisations need to be willing to change their process to incorporate usability across the various processes.
- Willingness to change, to be flexible and listen to the expertise that usability practitioners bring to the organisation is a key culture change that needs to be evangelised to an organisation.

  'They may have some idea of one of the many things that can be done to improve the usability, but that does not mean they know all of it. Some companies may come and say "we want a website, do something about it". Then I come up with the idea, "well we should do some usability planning and usability testing", "oh we don't need that". So, quite often, at least for my clients, some of them have a fairly vague idea of what they need and I try to persuade them.' #09

This concept has contributions from twenty usability practitioners, with sixty-six coded references. This concept was discussed in most of the questions asked during the interviews, but predominantly in the typical day discussion (seven practitioners), bad story (eight practitioners) and good story (six practitioners). This concept has a very strong base of support from practitioners interviewed.

Transformation of an organisation's culture to incorporate a usability mindset improves the usability maturity of the organisation. The usability mindset established at this level incorporates the usability thinking into organisational decision-making that will filter down to IS projects.

4.3.7. Usability activities involvement enhances usability mindset

The essence of this concept is that performance of usability activities provides an opportunity to involve project stakeholders and allows the propagating of usability value. Usability activities are not just about a focus on the usability findings. Usability activities provide an opportunity to build a usability mindset of project stakeholders. This involvement may take the form of direct participation, or purely as an observer, or having presentation of usability outcomes and findings. The involvement, which must be by all project stakeholder groups, must maximise the use of their time. It is this involvement in usability activities that makes the usability issues real to project stakeholders, improves usability understanding and helps define the usability mindset for the project.

An effective way of developing a usability mindset in a project is to involve all project stakeholders, in usability activities. These stakeholders include the project team members (like developers), organisation sponsors and managers, and users of the system. Involvement develops the usability mindset that enables appropriate usability decision-making throughout the project lifecycle.

> *'One of the things we always used to do when we were running pilot tests, we always used to get a developer from our sister team to come in and sit down and run through the actual session. I guess that was a good way for us to try to help give them an understanding and appreciation of what usability testing was, what kind of things come out of it. We sit down with them and describe the notes I have taken and some of the issues that were observed.' #14*

The right stakeholders need to be engaged from the start of the project. When usability practitioners work within an organisation (i.e. not as consultants) they find access to users easier to obtain, and hence have a greater chance of getting stakeholder involvement. Participation is not always important to stakeholders, they may not have any time to get involved, and the business does not provide any time release or work release for their involvement. Occasionally, a project team may not be able to, or are not allowed, to gain access to users. The range of users in the user community may be too large to involve everyone. This is where only a sampling of users must suffice.

> *'Stakeholder engagement was a mess. We had the wrong people in the group from the start.' #03*

'The people that we did have as stakeholders didn't make any time for it. They all sort of didn't make it their priority and so they made no time to pay attention or come to meetings or whatever.' #03

'It's hard to actually find real people who care enough that you can draw them in and get them involved.' #19

'Our group has very little touch points with actual end-users, unless we fight very hard to get usability testing done.' #21

The idea of involving stakeholders in a usability activity, especially stakeholders other than the primary user, in an observational capacity, for example, can be a powerful way of evangelising usability. As a result of seeing and believing, the value of usability was real; the usability mindset develops for the project.

'And the other great thing about it was like the developer, one of the developers or representatives was with us for all of those sessions. So they saw all of the struggles and they saw all the reasons of why we were doing the things we were doing.' #05

This concept has contributions from seventeen usability practitioners, with forty-six coded references. This concept was discussed in most of the questions asked during the interviews, but predominantly in the good story (nine practitioners). This concept has a very strong base of support from practitioners interviewed.

This concept highlights that for a usability mindset theme, involvement in usability activities is a concrete way of developing a usability mindset. This involvement should provide an opportunity for all project stakeholders to participate in usability activities and develop a usability mindset.

4.4. Collaborative Approach

The following set of concepts describes the importance of a collaborative approach that involves all project stakeholders in the performance of usability activities. A collaborative approach provides an opportunity to establish a shared vision and foster relationships with project stakeholders. It is important to involve all project stakeholders. Usability practitioners made special mention about involving IS project team members and senior organisational stakeholders.

'So managers, the users and the businesses expectations having a collaborative approach really helps to balance out the project benefits and requirements.' #20

The list of key concepts for this theme include:

- Establish a shared usability vision
- Crucial involvement by IS project team members
- Involvement by all project stakeholders enhances the collaborative approach
- Senior organisational stakeholder involvement
- Project stakeholder relationships must be fostered

4.4.1. Establish a shared usability vision using collaboration

The essence of this concept is that involvement is a key part of establishing a shared usability vision[12] with the project stakeholders. Involvement provides an opportunity to elicit domain knowledge, stakeholder's goals and project constraints that all shape the shared usability vision for a project. The usability documentation can be used to provide a sense of the shared usability vision, providing an opportunity for project stakeholders to review the usability vision and fornew stakeholders to get a sense of it. Another way to validate and improve understanding of the shared usability vision is, after establishing it, to communicate shared usability vision back to project stakeholders. Project stakeholders, who are involved in subsequent projects where usability is performed, develop a better usability understanding that improves the adoption of the shared usability vision for the project.

Collaboration by all project stakeholders through involvement in usability activities is one of the best ways to create a shared usability vision. Stakeholder involvement improves usability understanding and appreciation for the value of usability. This leads to a shared usability vision among stakeholders. As a usability practitioner, it improves the value of the usability practitioner role, to involve the stakeholders and take them on the usability journey. The creation of this shared vision must begin at the start of the project and be maintained throughout the project lifecycle.

[12] "Shared usability vision" is defined in the glossary. It is basically defined in usability terms, as an understanding of what usability is for a given project shared among all project stakeholders.

'I am never going to understand the domain or the technologies whilst the people that are on the project will understand these things, that belong to the client organization. It makes me smarter and better at what I do if I can involve them in my processes at least at review checkpoints but it's even better to actually take them with me on the journey.' #08

The usability requirements document, is one example, where the outputs of usability activities can articulated to provide a real sense for what the usability vision is for a given IS project. If the documentation does not make it real to current and new project stakeholders it makes it hard for them to gain an appreciation of the shared usability vision.

'120 pages, or whatever it was, and it took a lot of blood sweat and tears to create that.But the…and that explains how to do things…but the understanding of what the vision really was and how things would work, was in the document, but for some reason wasn't being accessed or whatever. And yet if this other guy, Tom, if he had been involved in my process all the way through, he would have been in a better place to understand that' #08

'Well they (developers) were just sort of focusing very much on the requirements as they were given them, just the documentation, but didn't really have the overall sense of "this is the end state that we are trying to achieve".' #03

A shared usability vision needs to be created across the organisation, across the various levels within the organisation, using the appropriate language to make it real and improve the shared usability vision. This shared vision must be communicated to all users, IS project team, managers, right through to the CEO of the organisation.

'Particularly as you go higher up in the food chain, the higher up you go in a company the more of a big picture view they're going to have. Like a CEO is not going to understand or care about the technicalities of the project. What they're going to be concerned about is bottom line and the customer experience. Because we look at that user experience / customer experience side of things, it's quite easy to talk to people at that high level. It makes the clients at the lower level look good, when they can go up the food chain and say look at this great customer experience I have provided, in a language that the CEO will understand. Because it's not a technical language, it makes them look good.' #10

It is hard to create a shared vision of usability without being present throughout the IS project's lifecycle, developing relationships and communicating with all stakeholders. This is often done

through involvement of a usability practitioner throughout the IS project (consultants are usually involved for a limited time frame) or regular meetings throughout project lifecycle.

> *'The realisation that to change a corporate culture to embrace user-centered techniques and see the competitive advantage of user experience work you need to be present in that company everyday having those conversations with those people and taking people down that sort of design path. You know its probably…I think…it is less effective to do that as a consultant because you are there for a limited time and you are kind of specialist. You are not building the relationships that you need to effect that change.' #05*

Involvement with usability activities over many projects can enhance the understanding and adoption of a shared usability vision for a given project. Presenting usability findings back to stakeholders allows them to absorb findings and draw their own conclusions, which can lead to a shared understanding and hence a shared usability vision.

> *'Maybe if we do fifty jobs together and they learn to think like we do, but most of the time they need to continue to have us to hold their hand, but when you do it like that, it's like they have ownership, about the change.' #17*

> *'What we need to do is elicit the right information out of them. Potentially present it back in a new way, so they, together with us, can help us make the decisions, about the directions they need to head.' #17*

This concept has contributions from thirteen usability practitioners, with forty one coded references. This concept was discussed in most of the questions asked during the interviews, but predominantly in the good story (seven practitioners). This concept has a strong base of support from practitioners interviewed.

This concept discusses one of the key goals of the collaborative theme, which is to establish a shared usability vision for a project. This vision can only be established through a collaborative approach in order to incorporate the various project elements goals. It's this shared usability vision that will enable better usability decision-making, provide better traction on usability findings and improve relationship and communication between project stakeholders.

4.4.2. Involvement by all project stakeholders enhances the collaborative approach

The essence of this concept is that involvement by all project stakeholders provides many benefits to a project that will enhance the usability outcome. Involvement is not one way and not restricted to the primary users. It is for all project stakeholders to be continuously engaged in usability activities, throughout a project lifecycle, in various collaborative approaches. Involvement can be through participation, observation or presentation of usability findings. Involvement is preferred over the usability practitioner being a user advocate. Involvement can provide usability data but can also provide project stakeholder feedback that can enhance the usability mindset for project. Involvement provides an opportunity to improve the acceptance of the value of usability and develop this beyond simple acceptance. Maximising the opportunity of project stakeholder involvement is important for usability credibility.

The involvement in usability activities of all project stakeholders and the acceptance of a usability mindset is a crucial part of attaining a good usability outcome. Involvement is not limited to the primary stakeholders (the users) of the system. Other project team members, such as developers need to be involved. Involvement of the business stakeholders is also important, especially those who are sponsoring the project and need to understand the value of usability. In order to achieve involvement that leads to usability acceptance, there are various aspects of this collaboration that need to be considered:

- User involvement may not always be possible for various reasons, these may include limited time to get involved, and the business does not provide any time release or work release for their involvement. The project may not be able to or are not allowed to get access to the primary users. The range of users in the user community maybe too large to involve, this is where only a sampling of users must suffice.
- Continuous communication between all project stakeholders, before and after and during performance of usability activities, helps maintain stakeholder interest in usability and is a form of continued involvement.
- Evangelise key stakeholders to be on side with the concept of usability to facilitate involvement and acceptance from all project stakeholders of the importance usability ideas and thinking. This can also take the form of usability education, selling value of usability or provision of usability documents that contains a memory of the usability mindset.

- Involvement may take the form of participation in or observation of usability activities. Both methods can be powerful in highlighting the usability vision and making the usability real to project stakeholders
- Involvement of project team members one of the ways to gain usability credibility and to increase the value placed on usability in an IS project (and future projects)
- Involvement in the research and analysis part of the project lifecycle improves the usability requirements for the project at the start. Select the right stakeholders to involve needs to be done from the start of the project.

  'Stakeholder engagement was a mess, we had the wrong people in the group from the start.' #03

  'The people that we did have as stakeholders didn't make any time for it, they all sort didn't make it their priority and so they made no time to pay attention or come to meetings or whatever' #03

  'We designed it, the concepts and took it to users and went through a collaborative process and refined the concepts and so on and then took it back to the business and again the business analyst in that project was very involved in every activity with me but we took it back to the business to talk about here is the design and so on but as we done this stuff and in fact you know the good enlightened client.' #08

  'We really made it real for them, but then we weren't selling them usability, we were just grounding so we can do our job.' #13

A usability practitioner can be a user advocate and provide an expert opinion on an interface design and interaction style but this is better done through involvement of real users, however this is better than no user consideration. The more user involvement attained, the less user advocacy is required. User involvement may be dropped in favour of user advocacy, especially if time or money becomes a factor in the IS project.

> *'This is my profession and I have had experience testing, working with users and I have seen some of the things that they commonly have trouble with. In some sense I do feel comfortable in being able to, say, look at the interface and hopefully give some thoughtful feedback. One of the things I always do stress is this is my professional opinion. But it is not till you can really sit it down in front of users and doing the more*

formal testing that you can really say, "this is what I think might be a problem but this is what people are actually having a problem with".' #14

Organisational resistance to getting stakeholder involvement with usability activities can occur within an IS project lifecycle. This resistance can be from the organisational managers of stakeholders needed, or resistance from the stakeholders because no resourcing has been provided to make up time missed.

'We agreed to disagree on that, and he got his way. And I wrote up my report, did the structure, and wrote up why I wasn't able to achieve some particular things, because of the project difficulties and not being able to liaise, not be able to get people involved.' #19

'Our group has very little touch points with actual end-users. Unless we fight very hard to get usability testing done.' #21

There were twenty usability practitioners who mentioned this concept. These contributions (one hundred and twenty eight coded references) were predominantly made when discussing aspects of collaborative approach theme, with some related across the other themes. It was predominantly discussed during the good story (fourteen usability practitioners), bad story (eleven usability practitioners) and typical day (eleven usability practitioners) discussion, with some discussion across all other interview questions. This concept has a very strong base of support from practitioners interviewed.

This is the main concept for the collaborative approach theme. Its contribution is the necessity of involvement in usability activities throughout a project lifecycle of all project stakeholders. Involvement is a two wayactivity. Usability practitionersutilise involvement to generate usability findings to improve usability for anIS, but also use it to develop a shared usability vision (usability mindset) for project.

4.4.3. Crucial involvement by IS project team members

The essence of this concept is that involvement of IS project team members[13] is a crucial activity in relation to improving the usability outcome for a project. It's by making the usability issues real to them that improves usability credibility and their own understanding of usability for the project. This involvement is preferred to user advocacy[14] by usability practitioners. This involvement also allows usability practitioners to understand the technological constraints. Lack of understanding of these limitations can create pushback or disregard of usability findings by developers. This involvement must be throughout a project lifecycle.

Involvement of IS project team stakeholders was discussed at length by usability practitioners interviewed. The interview participants indicated that it is important to obtain usability acceptance from IS project team members through the development of a good relationship. This includes all members of the project team, like the developers, business analysts and project managers.

> *'We had a really good well-defined working relationship with the rest of the project team. With the developers, the BAs, with the project managers...' #01*

The project manager must be committed to usability, throughout a project's lifecycle. It must be taken seriously and the results must be acted upon, otherwise it's not worth doing. At least one project stakeholder should have responsibility for usability. If no usability practitioner is part of project team, preferably a stakeholder from the IS project team should be given responsibility.

> *'I was just going to ask in this project it is like, " well you are either supporting us or you are not and if you don't want us in this project we won't work on it, it's fine we have a lot of other things to do". I am not going to have a headache working through this but there*

[13] 'IS project team member' is defined in Section 4.2, based on the discussions by the interviewed usability practitioners. It basically refers to those that are involved in the running of the project, which may include the IS project manager, business analyst, and developers.

[14] 'User Advocacy' is when project stakeholder cannot be involved and is represented by a user advocate who typically is the usability practitioner.

were issues and they revolved around, you know, a lot of them around the ownership.' #04

It is very important to have access to developers (or technologists) that are involved in the implementation activities of a project. Involvement by developers can have two-fold impact on understanding. First, the developers can gain an understanding of the value of usability. And secondly, usability practitioners can gain an understanding of the technological limitations under which the developers are working. This improves communication and understanding with project stakeholders about a key constraint: technology. Fostering a good relationship with the developers provides a great way of getting an understanding of what technological limitations exist with the technology being used to develop the system.

'Yep we have written our own mobile application development guide because of where we sat with the developers. We actually had a very very good view over the technical constraints and the types of things that need to be considered when you are developing a model product.' #06

'You have more access to the technologists and the developers, so you have a clear understanding of the limitations.' #15

'The positive of working within an organisation and being a usability person for that organisation, is that you have more access to subject matter experts within the organisation. You have more access to the technologists and the developers, so you have a clear understanding of the limitations.' #15

Involvement ensures the usability perspective is considered by IS project team members throughout a project, because usability issues are made real to them. If not involved then the usability practitioner may become the user advocates, which presents other problems such as gaining trust, credibility and acceptance from IS project team.

'One of the developers or representatives was with us for all of those sessions, so they saw all of the struggles and they saw all the reasons of why we were doing the things we were doing.' #05

'We sort of had confidence that the important things we put in there from a usability and user experience point of view weren't going to be compromised because the developer had seen it, they had seen why it was important.' #05

Various issues may cause developers to push back on making changes, based on the results of usability activities. These may include: limitation in the configurability of a software package; limits in the available toolkit in the software environment being used to implement; limited skillset of vendor/practitioner to utilise the software environment. Project may have locked down part of the implementation, such as the database design, and are reluctant to make any further changes. The changes requested will generate quite a bit of additional work for project team members, such as developers, which may impact on time or budget.

> *'I arrived. It was a fair way down the track of coming to the conclusion that they weren't going to change the user interface very much at all. They had been told by the vendors of the product that it can be configured. In reality they discovered two things: Once the deal was done, the vendors were less forthcoming in their willingness to make changes to the user interface, because they had quoted a certain price for the things and the less customisation they had to do the more profit…' #01*

> *'For the developer to see what you're on about, the number of times we get to come in and fix someone's UI, and we need to change stuff and the database is locked, can't change anything, then you're screwed. We can't do anything, because we want to reorganize stuff to make sense for people, performance and people.' #16*

Developers often ignore the results of usability activities and resist making changes to the system. Developers are focused on implementation without any consideration for its use. Often the UI design of a system has been done by a developer, which means that making changes to existing UI design, as specified by usability practitioners and their usability activities findings, is considered treading on the developers turf.

> *'There are times, you are right, they knock on your door and say "can you do some design or evaluation for us", but by then the design is already been done and built, and then you have to try and push uphill to change the design. Whereas if you had come in earlier and did the design and evaluation first, then things would go a lot smoother. So half the time you're battling with developers, because they have already designed something.' #15*

There were eighteen usability practitioners who mentioned this concept. These contributions (forty-eight coded references) were predominantly made when discussing aspects of collaborative approach theme, with some related across the other themes. There are fourteen practitioner who when discussing this concept also mentioned an aspect of the usability mindset

theme. It was predominantly discussed during the good story (nine usability practitioners) and bad story (six usability practitioners) discussion, with some discussion across all other interview questions. Usability practitioners who have a more managerial usability role predominantly mentioned it. This concept is a strongly supported concept that specifically targets IS project stakeholders for active collaboration in and across the project.

The collaborative approach theme dictates involvement by all project stakeholders. This concept highlights a particular group, IS project team members,which was discussedby usability practitioners. Their involvement enhanced usability outcomes, while not involving them could lead to resistance to usability recommendations made by usability practitioners.

4.4.4. Senior organisational stakeholder involvement

The essence of this concept is to gain acceptance and involvement from senior organisational stakeholders can improve usability outcomes. Their involvement provides the senior organisational support that can help overcome organisational barriers. Having this senior support means that usability is taken more seriously within the project and across an organisation. Involvement maybe limited, but constant communication of progress and usability findings through presentations enables senior organisational stakeholders the opportunity to be taken along the usability journey, mitigating any usability surprises if communication of usability is only done at the end.

Senior organisational sponsorship of usability can provide a positive support to its acceptance within an organisation, even when other project stakeholders may resist it. Without senior organisational stakeholder sponsoring usability, there is a danger of usability being cut or reduced during a project lifecycle.

> *'…which met with huge resistance, but the only thing that made that project a success, was that we had a very good relationship with the client, who was quite senior and could just keep on barrelling ahead with the project. If we did not have him on side that whole project would have stalled because of all the resistance from those people.' #10*
>
> *'The board was on board and everything and that was good.' #19*

Organisational stakeholder involvement in promoting and/or providing support to the performance of usability activities and the usability acceptance in projects need to consider the following:

- Organisational stakeholders, especially the sponsor, must be involved throughout the project to support the performance of usability activities.
- Help overcome barriers/silos within the organisations
- Help increase the usability maturity of the organisation by facilitating organisational culture change
- Sponsorship of usability at the highest level in the organisation is preferred, i.e. CEO, at this level it shows the organisation that usability is a serious consideration for all projects. It is not something that is considered expendable, and the first thing to be removed by management when trimming project for whatever reason.
- Involvement of organisational stakeholder can improve the acceptance of usability.

  'Things have moved on, budgets have been blown, time has passed, sponsors have moved on. We were getting very little interest from the broader business about what we were learning in testing.' #01

  'I think it goes a long way and I think quite a lot of barriers between different areas of the business, you know, like the silos, "we do this and you do that," have really been challenged and broken in a few areas.' #07

  'The make or break thing, whether a project will succeed or not is how much the organisation is behind the idea of user centred design." #10

The higher up the business stakeholders are, the more traction is attained in the project for performance and for adherence to the usability activities and usability outcomes. Involvement of business stakeholders is important to highlight the value of usability and to participate in concording business usability goals and other usability goals within the usability requirements. The larger an organisation is the more stakeholders become involved which makes it harder to get multiple senior managers involved in the usability.

> *'One of the problems with [large organisation] is, as the cost goes up more people start to get ownership of it, which means that it gets pulled in many different directions and the higher up that interest goes in senior management, the more staking of the turf, of the ground, goes on, which means a lot less collaboration and a lot less open involvement, it tends to be 'right I am happy with this now, your turn', typical waterfall model." #21*

In order for usability to be taken seriously within a project a senior project sponsor must be brought on board and involved in usability activities.

> *"One of the things that we always try to do, especially on bigger projects, is get a senior project sponsor on board, with the project. So that way we have someone who has some clout in the organisation, helping drive the project and supporting the project. So when you do come across those obstacles they can help you get through them." #10*

There were seventeen usability practitioners who mentioned this concept. These contributions (thirty-nine coded references) were predominantly made when discussing aspects of collaborative approach theme, with some related across the other themes. It was predominantly discussed during the good story (six usability practitioners) and bad story (seven usability practitioners) discussion, with discussion across all other interview questions. This concept has a strong base of support from practitioners interviewed.

This concept emphasises the importance of senior organisational management involvement in a collaborative approach. This involvement may be predominantly through usability presentations, done throughout a project lifecycle, to take the senior stakeholders along the usability journey. Involvement will also enable senior management business goal to be elicited and incorporated into the usability mindset for the project.

4.4.5. Project stakeholder relationships must be fostered

The essence of this concept is that the development and fostering of good relationships between the various project stakeholders is the basis for improving involvement in usability activities. The fostering of good relationships promotes feedback, communication, usability value and acceptance of usability. This is done through presentation of usability findings, establishing a living usability document containing the usability mindset and evidence of the usability issues. Senior project sponsors help lubricate the relationships with project stakeholders and enables continuous involvement through a project lifecycle.

Developing good relationships with all project stakeholders can improve the commitment to usability. Usability practitioners have identified that a good relationship with project stakeholders is a key criteria to be considered.

> *'We had a good engagement on the client side, we worked with them very closely, because we had worked into bigger and bigger bits of work until we had got this. We just,*

really really, set up that relationship well that time, they were in a different space, they were very willing to learn.' #17

'The realisation that, to change a corporate culture to embrace user centered techniques and see the competitive advantage of user experience work, you need to be present in that company everyday having those conversations with those people and taking people down that sort of design path, you know its probably, I think it is, less effective to do that as a consultant because you are there for a limited time and you are kind of specialist. You are not building the relationships that you need to effect that change.' #05

There are various mechanisms to impact on stakeholder communication to ultimately improve collaboration with project stakeholders. These mechanisms are positive, negative or have further consequences. The following are positive mechanisms for communication with project stakeholders:

- Usability findings from usability activities can provide a real sense for what the usability vision is for a given IS project.
- The creation of usability documents must be pitched at the appropriate audience and must present hard evidence in order to enhance usability understanding and acceptance. The usability document must communicate usability understanding across project stakeholder groups. When stakeholders are engaged during a project lifecycle, an induction of the usability mindset, presented in the usability documents.
- The management of the relationship with project stakeholders needs to be done from the start and throughout the life of the project.
- 'Coffee is King', getting stakeholders out of their work space and into a social space, provides an opportunity to better discuss aspects of the project.
- A well-sponsored (by senior organisational manages) usability engagement helps lubricate the relationships needed by the usability practitioner.

The following are negative mechanisms for communication with project stakeholders:

- Often a usability practitioner is brought in as a user advocate, to bring the users voice to the project team table. Usability practitioners prefer stakeholder involvement rather than being user advocates, but will be user advocates if it's the only option. Usability practitioners are often brought into a project to be the interpreter between the business and the project team members, especially the developers. Usability practitioners often

find themselves riding the boundaries of the project to aid in the communication across the project and various related stakeholders groups. These roles provide a positive usability outcome but do not enable development of a shared usability vision for a project or a usability mindset that is used across projects and within organisations.

- Change of project team members can result significant loss of in relationship fostered and means additional effort to foster new relationships.

The following are further consequences for communication with project stakeholders:

- Providing feedback on usability activities and outcomes, regularly, keep communication open and involve stakeholders with usability.
- Presenting findings, observation and other data back to stakeholders involved to validate findings and understanding of findings. Communication is not one way, often elicitation of information from stakeholders is presented back to validate and create shared vision
- Relationships can be used to help broaden the perceived ownership of the project.
- Relationships are the key facilitator to better communication and improved understanding of key usability ideas to all project stakeholders.
- Important to take stakeholders on the usability journey, especially business stakeholders, to provide constant communication of the usability findings before the final usability report is submitted, to avoid stakeholders being shocked by alarming usability results.

  'We had a really good, well defined working relationship with the rest of the project team. With the developers, the BAs, with the project managers and the business bosses...' #01

  'I would find myself in these projects where I was basically an interpreter, where I was, I don't have a technical background, but I would be brought on board as the user advocate, but I was also there to sit between the technical staff and the business staff and help them talk to each other.' #10

  'What we need to do is elicit the right information out of them. Potentially present it back in a new way, so they, together with us, can help us make the decisions, about the directions they need to head.' #17

  'You have got to be able to communicate across those boundaries, in order to be effective at it you need to be fluid across those boundaries, you need be able to talk a bit about

implementation, you need to be involved in the discussions, so you can explain what is going on and the rationale. And they can explain about implementation from their end.' #21

Establishment of trust with a client is an important way of establishing a credible relationship where communication of usability and its value to a project is done. Stakeholder experiencing usability for the first time, do not trust in the value of performing usability activities and may not value the generated usability outcomes.

'The second time we work with a client, first of all they know how you operate and they have seen the benefit of using you before, so when you say something, "alright we trust you even though we don't fully understand the reason, we trust that this is the right way to do it". So trust is a very very important, especially for a consultant.' #18

Usability practitioners act as a form of interpreter between the project team and the business, the users and the business and the users and the project team. Various usability activities can be used to help bridge this communication gap. Relationships must go both ways, *'They listened we talked'* and *'we listened they talked'*, not necessarily in this order. This bridge also occurs at various levels in an organisation and being able to communicate the appropriate usability message from users and managers, up to the CEO of an organisation. There are various considerations to be made when communicating across boundaries and levels in an organisation:

'Their willingness to be taught, and/or listen was good, or maybe we were more sophisticated in that job in delivering it, it's hard to know. They listened we talked, we listened they talked, it was a cooperative thing, there we had actual relationship bonds there.' #17

- The primary stakeholders for the project are often the users who will be performing the tasks with the system. Creating an appropriate user experience for this primary user group will enable improved usability in performing their tasks. When users are not allowed, don't have the time or are unwilling to participate in usability activities, this often leads to user advocacy by usability practitioners.

  'They never allowed me to talk to the end users, they just said we are the expert and we know how people, this is how people should be doing it. We don't care how they want to do it or how they want to interact with the system, this is how she should be doing it.' #13

- The stakeholders engaging the usability practitioner may not have enough understanding to articulate who the key users are. The users that are being engaged may not be representative of the majority, they may be the most experienced or least experienced.
- Need to consider both the user and business needs, but additional users, such as the marketing and legal departments may have an impact on the usability requirements.

  'We then got to the next stage, which was a problem of how we were going to go ahead with this, and we got swamped by the legal team.' #02
- A good relationship with the developers provides a great way of getting an understanding of what are the technological limitations in a project.

  'You have more access to the technologists and the developers, so you have a clear understanding of the limitations.' #15

There were twenty usability practitioners who mentioned this concept. These contributions (eighty-six coded references) were predominantly made when discussing aspects of collaborative approach theme, with some related across the other themes. It was predominantly discussed during the good story (twelve usability practitioners), bad story (eleven usability practitioners) and typical day (five usability practitioners) discussion, with discussion across all other interview questions. This concept has a very strong base of support from practitioners interviewed.

This concept contributes the basic requirement for a collaborative approach, which is the fostering of relationship with project stakeholders. This establishing and development of relationships is important way of continuous communication to enable involvement of all project stakeholders and establishing a shared vision.

4.5. Project Constraints

The project constraints theme highlights the various project elements that provide constraints that conflict with other project elements. These project constraints, discussed in detail in the various concepts in this group, need to be elicited from the various project stakeholders. An important part of the project constraints theme is the concordance of these conflicting usability goals and selection of usability activities, when considering the project constraints. The group of concepts discussed include:

- Usability activities compliance within a project lifecycle

- Constraints dictate usability activity selection & performance
- Technological constraints
- Allocating resources to usability activities
- Organisational constraints external to project
- When usability is initiated

4.5.1. Usability activities compliance within a project lifecycle

The essence of this concept is that performance of usability activities within the project lifecycle process may be ignored or simply complied with without consideration of usability findings. Incorporation of usability activities into a project lifecycle improves the visibility of usability to project stakeholders. The findings of usability activities must be considered in subsequent project activities for them to have an impact. Evangelising the performance of usability activities within a project lifecycle is an important issue because it can form the basis for project stakeholders developing a usability mindset.

Establishing usability activities within an organisation and within the project lifecycle is an important way of improving usability outcomes. Usability maturity is attained through continual improvement of the project lifecycle employed and the compliance with the usability activities to be done. The major issue for an organisation is changing the perception that usability is an end game activity to something done throughout the project lifecycle.

> *'So we are still establishing protocols and making sure everything is happening. We are, kind of, the watchdogs at this stage.' #02*
>
> *'Then of course there is a whole lot of transformation of the business in terms of how we do business and as to what matters and so I feel like our area has matured a lot. So what has happened is we have shifted from "oh they are the people that stop us doing stuff". You know well down the product development lifecycle and we have shifted and are significantly well up towards the front. And that is not to say we get involved in all projects but, compared to where we were, it is so different. It's really been a very interesting journey.' #07*

Usability outcomes are ineffective when other project activities, such asdevelopment, are performed before, or in parallel with, usability activities where the outcomes would normally impact how the next project activities are performed.

> *'I meet with them once a week. They hand over a small portion of the website to me. They say, "this is the part I want to do today." They explain to me how it works, and I will take that understanding and plan the interface. Next week we are meeting and discussing things. As we discuss we realise there is some understanding, internal understanding, that they did not tell me earlier, which I need to incorporate into the interface and walk away again with my drawings and make those changes and come back again. And they get approved, then they hand over the next bit. So the entire application has been broken down into little bits, because it's such a complex application, and because there is so much knowledge about it, so much insider knowledge, that it would be very difficult for me too get a hold of all that in one hit. And in theory that is not bad, but the problem is that the client is developing as we go along. And the more and more, as we go along, the more iteration, the more screens we do. I make changes as I go along, because I realise that the functionality that I didn't know before needs to be considered etc, etc.' #09*

Usability practitioners may be working with a development lifecycle that does not focus on the performance of usability activities throughout the project lifecycle. One of the roles played by a usability practitioner is to suggest where usability activities can be incorporated within the project lifecycle. Often the key stakeholders of a project don't know what they want from usability, so they look to the usability practitioner to suggestion how to incorporate it within the development process. Consultants do not often get the opportunity to change the project plan, unless employed from the start, when employed for a specific usability activity.

> *'Maybe creating/or going through a project plan that is already in place and seeing whether or not we are able to help them develop a user centered design plan to help them develop their solution better.' #02*

> *'I asked to put out proposals and try to flesh out and talk to project team leaders and just try to get a sense of how we can help integrate some usability or user centred design type work on the actual project, so one side of the work is the projects that are going on.' #01*

In order to improve compliance withperforming usability activities within a project lifecycle, evangelising may need to be done to introduce or maintain the performance of usability activities. This evangelising needs to bring the various stakeholders to the usability table or bring

usability to the project team table, not just to perform the activities or be involved, but incorporate usability into the project lifecycle.

> *'I think it is good if I can get engaged early on and get in and talk to project teams just to help, kind of, let them understand my range of different things that could happen and the times that would take to do that. Because sometimes you are a little bit dictated upon, like they will have predefined project lines.' #14*

> *'They say "we want to do some testing", "actually I think it sounds like you want to do workshops instead", so I get to push them a bit there.' #18*

There were fourteen usability practitioners who mentioned this concept. These contributions (thirty-three coded references) were predominantly made when discussing aspects of project constraint theme, with some related across the other themes. It was predominantly discussed during the good story (four practitioners), bad story (five practitioners) and typical day (nine practitioners) discussion, with some discussion across all other interview questions. This concept has a moderately strong base of support from practitioners interviewed.

This concept highlight, for the project constraint theme, the importance of having a project process that includes usability activity performance that is complied with by project stakeholders, this compliance within a process can become a constraint if followed blindly or ignored completely.

4.5.2. Constraints dictate usability activity selection & performance

The essence of this concept is that the selection and performance of usability activities are often dictated by the project constraints. Such things as time given and monies provided, along with when engaged, impact what can be done. The project lifecycle and other organisational issues may dictate what is to be done. This concept highlights the need to be involved at the start of a project so that the appropriate usability consideration is made in the project plan. Also, the skill required of usability practitioners is to be flexible with the performance of usability activities in order to maximise usability findings within project constraints.

The selection of usability activities to be performed during a project lifecycle is important and needs appropriate consideration, based on the project variables. There are quite a few considerations to make in relation to deciding which usability activities to be performed. The following list has been discussed by various interviewed practitioners, which include:

- The time available or the time left in the project that is allocated to performance of usability activities,
- The outcomes of usability or other project activities will dictate, for example, what design or evaluation activities which will provide the most value,
- Organisation politics can impact on the decision of what usability activities must be performed,
- The stage in the project when the usability practitioners are engaged, i.e. start, middle or near end,
- The value add provided by the performance of one or more usability activities, and
- The need for flexibility with usability activity in order to maximise usability outcomes.

'What suits the project and what suits, to be honest, what suits the timeframe available, probably eighty percent what determines what activity you'll do is how much time and resource have I got as opposed to what is the appropriate thing to do for this gig. #01

'Level of flexibility, you can go, "this is our recommendation", so right we will have to come up with a compromise. That's the thing we hate the most, but we have to do that sometimes.' #15

'Tweaking what you can given their constraints, probably already released, or they're going to release in a week or so.' #17

Performing usability in a project can be seen as delaying a project, when users can actually complete the tasks, no matter the human functional costs. Project managers don't often have personal performance indicators that incorporate the usability quality attribute. Education of usability needs to be done upfront in order to enable usability decisions in the project plan and budget to be made.

'A lot of times, none of them, the project managers, have any performance indicators against quality. Its more about delivering something on time, that's what matters most. When you introduce quality in projects that are all about time, it becomes one of our biggest challenges.' #20

The analysis found that it is important to focus usability and define how it will be done throughout a project. The usability scope for a project is an important constraint that needs to be understood, planned and documented.

'We didn't have scope nailed out even when we started design and still at the stage of development the scope was sort of flapping all over the place.' #03

'I can think of four things, barriers, where things can go wrong. I will just write this down or otherwise I will forget one of them, one is poor scoping, there just isn't enough time to do anything well.' #08

A rigid usability scope specified in the project plan can inhibit iteration or the ability to going back to perform usability activities based on the usability findings.

'There is not scope in the project plan for me to go back. I could easily if there was scope. It would be really easy for me to go and do another open card sorting or closed card sorting and then I would be able to get some sort of patterns in the hierarchy…' #11

The time given to perform usability activities will and can dictate or limit what usability activities can be performed. The project manager often wants to parallelise usability activities with other project activities or reduce time given to usability activities. Sometime project managers believe that expanding the usability team will speed up the usability activities that need to be performed for a given project.

'Not just the developers and often, sort of, project management people as well, who are thinking, "can't we parallel this task, this can't possibly take this long, we need more time for QA or development and can't we kind of squash this phase down".' #03

Getting usability in late in a project development process is certain to mean tight timelines or no time to perform usability activities properly. When timelines are tight, being flexible with the usability activities chosen or performance of usability activities selected is needed in order to maximise their potential.

'Timeframes being tight, there is not enough time to do testing properly, not enough time to go back to fix things up. User can't get involved and see a first cut. That is not necessarily the best outcome for usability.' #20

There were seventeen usability practitioners who mentioned this concept. These contributions (forty-one coded references) were predominantly made when discussing aspects of project constraint theme, with some related across the other themes. It was predominantly discussed during the good story (six practitioners), bad story (eight practitioners) and typical day (six practitioners) discussion, with some discussion across all other interview questions. This concept has a strong base of support from practitioners interviewed.

This concept highlight, for the project constraint theme, the key task of selection and performing of usability activities is constrained by project constraints. This is predominantly impacted on by the main project constraints discussed within this theme.

4.5.3. Technological constraints

The essence of this concept is that technological issues are a significant constraint. They limit the possibilities from a design perspective, and generate usability risk when upgrades of the software are applied. Vendor selection and software packages being discussed for a project (usually at the start) requires usability practitioner involvement to enable usability consideration to be factored into the vendor selection decision.

Technological constraints are often misunderstood by project stakeholders, things like to what degree software packages can be configured by the vendor or developers and being able to react to usability findings generated by the usability activities.

> *'I arrived, was a fair way down the track of coming to the conclusion that they weren't going to change user interface very much at all. The vendors of the product had told them that it could be configured; in reality they discovered two things:once the deal was done, the vendors were less forthcoming in their willingness to make changes to the user interface, because they had quoted a certain price for the things, and the less customisation they had to do, the more profit.' #01*

When software packages don't support the changes specified or needed to support the usability requirements, this will lead to an increase in human performance costs. This often means the usability practitioner needs to mitigate the usability issues with the package by providing training and/or documentation to work around usability issues. Upgrades to software packages, especially off the shelf configurable software, require re-applying all of the changes made to the standard software package. This often will also require another cycle of usability activities. Technological constraints can often lead to additional usability risk.

> *'That was a big problem because there wasn't a good fit between the package and, kind of, what was desired. And they tried to really, kind of, put a square peg in a round hole and our job was to kind of try and smooth that transition and it was just impossible.' #04*
>
> *'A good part of the messaging from our analysis (testing) had to be, "these are the issues we see that will need to be addressed in training, process definition, documentation, help*

desk support, because we were not getting any traction on actually changing the UI". I guessed we could have wimped it, and said "here are all the changes that you need to make to the UI, good luck with that". But it clearly was not going to happen, so the more responsible thing was to try and mitigate this and try to get the best result possible.' #01

The vendor selection often included the software package to be used for implementation of the project, an important activity for usability practitioners to be involved in. This enables the technological constraints to be elicited and consideration from a usability perspective, rather than be constrained later by them.

'We were involved in the vendor selection but our voice was not heard so there was our first problem. So even though our usability people had explicit requirements around things like being able to customize, being able to work, even when vendor is inflexible, we were overruled by a number of technical and business criteria, which were deemed to have higher value. And so we were to work with a vendor that we had some concerns about.' #06

There were eight usability practitioners who mentioned this concept. These contributions (twenty-four coded references) were predominantly made when discussing aspects of project constraint theme, with some related across the other themes. It was predominantly discussed during the bad story (seven practitioners) and was not discussed during the good story discussion, with no discussion across all other interview questions. This concept has a moderately strong base of support from practitioners interviewed.

This concept highlights the impact of technological issues to the project constraint theme. It can have an impact on the vendor selection, being able to resolve usability findings, flexibility of configuration of interface design and interaction style.

4.5.4. Allocating resources to usability activities

The essence of this concept is that time given and monies allocated to the performance of usability activities need to be considered carefully upfront in the project plan. This project constraint is the most common constraint that impacts on the performance of usability activities. When this constraint is at play, flexibility is required in usability activity performance to maximise usability findings. Senior stakeholder sponsorship is needed to aid in increasing the allocation of usability resources to a project plan.

When specifying the usability requirements for an IS project, due consideration needs to be made in the project plan to the time given and budget allocated to the usability activities to be performed.

> *'So, it's really up to us, up to the person writing the project plan, which around here is me, to make sure we have got all the information we need from the client in order to write an effective project plan that fits their time and budget constraints.' #10*

Budgetary constraints potentially impact the usability consultant's performance of usability in usability engagements more than organisational-based usability practitioners. This may lead to usability consultants having a lower impact on the usability outcomes of a project.

> *'Negatives: tighter project, because cost is always a factor, and we work on a billable concept; billable hours, therefore you are cramming things a lot more, clients won't want to pay you as much therefore you have to sacrifice some of your processes, omit them or not do them as fully as you would like to. Whereas internally if you are working within an organisation you set the timeline, "look I need to test 20 users", that's how it's going to be. Whereas externally, 20 users equals $20,000 for example and the client may say yes or no, you may have to drop down to five users, which then means it requires a lot more of your expertise to try and design something that works based on a limited number.' #15*

The time given to perform usability activities can dictate or limit what usability activities can be performed. The project manager often wants to parallelise usability activities with other project activities or reduce time given to usability activities. Sometimes project managers believe that expanding the usability team will speed up the usability activities that need to be performed for a given project. Getting usability in late, in a project development process, is certain to mean tight timelines or no time to perform usability activities properly. When timelines are tight, being flexible with the usability activities chosen or performance of usability activities selected is needed in order to maximise the potential for beneficial usability outcomes.

> *'It was good because we had time to do UI tasks and usability tasks properly and we got a good outcome in the end and it just got accepted.' #03*

> *'He had these expectations that there was going to be this raft of people employed and therefore it could all be done within this incredibly short period of time.' #07*

> *'You are coming in really really late in the project and sometimes the timelines are really horrendous, even to the point where there is that question, people on the project team are*

hostile. You give them the information, "here are the things people are having trouble with", "here is the video of people doing that", "oh, we gotta shift this", "it's too late, development is almost done, its due Friday".' #14

'The thing is, that the methodology exists, but the thing is, it does not mean that we can do everything all the time. Time factor, it's the biggest factor for us; time and money, because our team hasn't got money.' #20

The improving of usability understanding with key business stakeholder can improve the time given to usability activities in a given IS project. If additional time is needed to act on usability findings, that may require further design activities, this needs project stakeholders having a usability mindset to given it due consideration in project.

'Sometimes when we talk to the key business people, the money crunchers, they don't see why spending money, delaying the project another month, just to fix up the user interface a bit to make it more user friendly, that's just cost us money, people can use it now, people can actually complete a task." #18

There were seventeen usability practitioners who mentioned this concept. These contributions (forty-nine coded references) were predominantly made when discussing aspects of project constraint theme, with some related across the other themes. It was predominantly discussed during the bad story (eight practitioners) and good story (seven practitioners) discussion, with some discussion across all other interview questions. This concept has a strong base of support from practitioners interviewed.

The project constraint theme is predominantly affected by the time given and budgetary allocation for usability activities throughout a project lifecycle. This concept has a significantly strong contribution to project constraints that impact on usability.

4.5.5. Organisational constraints external to project

The essence of this concept is that various organisational goals and constraints may have significant impact on the primary usability goals of a project. Organisational constraints that contribute or impact on usability goals may include political issues, rigid organisational

processes, upselling[15] requirements, outsourcing usability activities, ambitious usability requirements, loss of key stakeholders, and vendor resistance to requested changes. Usability practitioners need to be sensitive to these organisational aspects, incorporating them into the usability mindset. It's through involvement that these organisational aspects can be elicited and that any conflicts can be highlighted to project stakeholders for resolution or usability practitioner for concordance. A usability champion is needed from each of the project stakeholder groups to champion their perspective (e.g. organisational, primary user, technological constraints). This conflict between usability goals can occur anytime during a project lifecycle, but mainly at the start if most goals and constraints are elicited at that time, therefore a usability mindset is needed to concord them.

In order to effectively perform usability activities throughout a project lifecycle, consideration need to be made for the various organisational project elements, their goals, and how these conflict within a project. The project elements discussed by the interviewed practitioners include:

- Legal issues that impact on aspects of the functionality of system, interaction provided and information displayed.

  'Awful lot of legislation around what you should and shouldn't, can and can't, and must do, that you need to know.' #01

- Political issues, whether they be government or commercial organisations, or consideration for political issues internal or external to organisation.

  'The majority of the time we are protected from that [organisational politics]. We go in, we do our work, and the people that have engaged us are managing that sort of thing. But I have had experiences where it has affected the work that I have done.' #11

  'Correct, for government agencies, I think politics is a big player, bureaucracy plays even a bigger role sometimes.' #15

- Upselling[15] of other organisational interests overlayed during user activities.

- Loss of interest by project stakeholders in usability vision for project

[15] Upselling is an organisational goal that requires other organisational services or products to be marketed to users while they are performing their primary tasks with the information system.

'Things have moved on, budgets have been blown, time has passed, sponsors have moved on. We were getting very little interest from the broader business about what we were learning in testing.' #01

- Project stakeholders becoming resistant to change of their designs, requiring additional evidence to facilitate change.

  'Some UI designers and usability engineers get really precious about the design, and it's a real turnoff to clients.' #10

Organisational commitment to resourcing of usability can constrain a project.

- Lack of usability resources leads to outsourcing of usability activities to external usability consultancies. This occurs when no internal organisational usability team exists.
- The internal usability team cannot cope with the demand of providing the usability services required by organisational projects.
- When organisation want to validate the internal teams usability outcomes.
- When a specific usability skill is needed and does not exist within the organisational usability team.

  'We do a lot of outsourcing. Usability 1, PTG and Ideal Interfaces - there are a lot of companies around that we have used for various sorts of things.' #02

  'I tend to resource it out to a consultant, purely because it's something that we know what to do and how to do it, fairly clear cut…' #12

There were seventeen usability practitioners who mentioned this concept. These contributions (ninety-five coded references) were predominantly made when discussing aspects of project constraint theme, with some related across the other themes. It was predominantly discussed during the bad story (thirteen practitioners) and good story (seven practitioners) discussion, with some discussion across all other interview questions. This concept has a very strong base of support from practitioners interviewed.

Organisational goals and constraints have a significant impact on the usability outcomes. They provide another set of goals and constraints that may conflict or compete within a project's usability mindset.

4.5.6. When usability is initiated

The essence of this concept is that usability practitioners engaged too late in a project lifecycle can harm the usability outcome. Engagement of usability practitioners early enables involvement in the project plan, able too give due consideration to the time given and monies allocated to usability, plan the usability scope for project, improve the usability understanding across project stakeholder, and educate, selling and evangelise usability to project stakeholders. Ultimately, being engaged from the start enables usability practitioners to develop a shared usability vision for the project. When involved late in the project lifecycle the level of impact on project stakeholders usability mindset is limited, which reduces productivity of usability findings from performance of usability activities. Ethical concerns by some usability practitioners when engaged late, (mainly to tick a project activity box) in project lifecycle to perform usability is that usability findings cannot be considered; why waste time performing usability?

When usability practitioners are engaged late in a development process, the opportunity to make changes to the design, or get value from the performance of usability activities and the resulting usability findings, diminishes. The analysis found that it is important to be involved throughout a project lifecycle, but in the unenviable times when you're brought in late, is it ethical to perform usability activities when you know the usability findings can not be acted upon in the project.

> *'Sometime you have to be careful when you are bought in late, and you do have to say, "if you don't have the time, I am not going to waste my time, it's a waste of time if you don't actually have the time to be able to fix stuff up".' #14*

The value of performing usability activities throughout a project lifecycle must be articulated up front, as early as possible in the process. It must be made clear and quantifiable that the benefit of performing usability upfront in a project lifecycle is better than patched with increased help desk support, training and documentation.

> *'And one of the downsides for usability practices in large associations, is that help desk calls and training materials go into a big bucket, whereas our service they have to pay for upfront. So when you get these help desk bills and that sort of stuff, what program has caused it all.' #12*

When articulating usability requirements upfront it should be clear what usability direction the project is taking. Part of the usability requirements is a set of key usability goals that provide the

focus for many usability activities performed throughout development process. This cannot be done if usability practitioners are engaged late in a process.

> *'Good requirements upfront, in terms of where we were headed and what the scope was going to be. And then we had a good project plan in terms of how much time we had to get our work done. And we actually had three different rounds of user testing.' #03*

> *'So we arrived there, first question, "where are your requirement specs?" "It's an internal project, we don't have anything". It was for their staff assessment, it was for an application that was going to be used worldwide, by every single employee at [company name].' #13*

> *'That's what they would say, that's what they tell us when we go out and interview. So we heavily overweight requirements because it is probably the number one, after a couple of things, the number one area of just about all software failure is bad requirements. And we use our good psychological techniques of job analysis and other things, to understand what the hell people actually doing, map it all out.' #16*

Engaging a usability practitioner late in a project lifecycle reduces the development of a shared usability vision with project stakeholders. This effectively limits the amount of usability education, selling, evangelising that can be performed to improve usability understanding.

> *'We were trying to educate the clients that a lot of times its too late to get in at the usability testing, because something is already built they have spent months and months on. And if we come back and say, "oh no, you need to redesign everything from scratch", that's not what they want to hear. They're not at the level or stage that they can actually do that, like two weeks before launch, or something like that. So, we actually try to educate them, saying we should probably get in as early as possible.' #18*

There were fourteen usability practitioners who mentioned this concept. These contributions (thirty-seven coded references) were predominantly made when discussing aspects of project constraint theme, with some related across the other themes. It was predominantly discussed during the bad story (seven practitioners) and good story (six practitioners) discussion, with some discussion across all other interview questions. This concept has a moderately strong base of support from practitioners interviewed.

This concept highlights that the touch point usability has throughout a project lifecycle can be a significant project constraint. It can also impact the usability mindset attainable and collaborative

approach allowable. An engagement from start to end of a project lifecycle and beyond is preferred.

4.6. Usability Practice

The following set of concepts describes the importance of usability practice, in improving a usability practitioner's skillset, and the role-played by usability practitioners in a project. The skillset of a usability practitioner in applying usability techniques is important, but the experience gained in applying usability techniques in various context give a practitioner the flexibility and knowhow to maximise the usability findings for a given activity. The role played by usability practitioners can include the educating of project stakeholders, measuring usability goals, evangelising usability, and validating usability practice. The concepts that form a part of this theme include:

- Usability education of project stakeholders
- Measuring usability goals
- Maintain flexibility with usability practice
- Managing stakeholder involvement
- Evangelising usability to project stakeholders
- Skillset and experience of usability practitioner
- Validation of usability practice
- Usability team practices
- Demonstrate value in engaging usability practitioners

4.6.1. Usability education of project stakeholders

The essence of this concept is that education of project stakeholders is required to improve the usability understanding for a project. This may include workshops, tutorials, involvement in usability activities, or one-on-one mentoring. This education allows usability activities to produce better usability findings, allows better usability decision-making and ultimately improves usability maturity of stakeholders and organisation. Usability education is not limited

to the primary stakeholders, it includes all stakeholders, especially IS project team members and senior organisational stakeholders.

Education of project stakeholders involves increasing understanding of usability and understanding of usability activities. It's important to keep the language simple, understandable by stakeholders involved, especially when stakeholders are involved in usability activities. Usability understanding can be increased through making the usability issues real to all stakeholders, through involvement.

> *'You know it is all about understanding the domain requirements, the task requirements and all that and making those visible to the programmers and the rest of the business and then understanding, "do we optimize on those or make a better way to work",ensuring that we don't sink it in some other way.' #04*

> *'They know that they can give back, they can describe things because they are not trying to talk in technical language which sometimes they try and do when on computer' #03*

When usability practitioners get involved in a IS project where the IS project team members are novices to the concept of usability, usability education is needed. This is done through skilling up of stakeholders, mentoring, and involvement in usability activities, usually in an observational capacity.

> *'I was trying to build her skills up. We were both doing work.' #19*

> *'I did is. I ran workshops, education workshops with product management, educating them about usability and user experience, the difference between usability and user experience.' #21*

Usability education is a key role of a usability practitioner at three levels. The first is the usability mindset to improve the organisation's usability maturity. Secondly, educating project stakeholders of what the concept of usability is, what usability activities are, and the value of performing them. Finally, education and mentoring of project stakeholder(s) that are taking on the usability practitioner role for a project. Organisational usability practitioners have a greater opportunity to improve the usability understanding because they are more visible within the organisation for consultation and clarification of the usability mindset, activities and findings.

> *'I have been really enjoying at the [company] is there is a pretty high awareness of usability so there has been a lot people kind of knocking on my door so to speak, asking me to help and give some advice.' #14*

'They were already a usability person to start with, needed a win, we taught them, we did a lot of work with them, they started to think like we thought, started to borrow some of our template ideas. By the end of it, what do you think about this, it was like CHIC-CHONG, CHIC-CHONG you may want to do it like this, CHIC-CHONG, it was fine, they will move on and the company will need us again, but at least that one person made a connection with us.' #17

'This means an organisational shift, it means cultural shift. Because you don't get organisation change with culture change, you don't get culture change without education and…' #21

There were twelve usability practitioners who mentioned this concept. These contributions (thirty-two coded references) were predominantly made when discussing aspects of usability practice theme, with some related across the other themes. It was predominantly discussed during the good story (six practitioners) discussion, with some discussion across all other interview questions. This concept has a moderately strong base of support from practitioners interviewed.

The usability practice of usability practitioners relies heavily on education of usability to improve perceived value, understanding and maturity of organisations and project stakeholders.

4.6.2. Measuring usability goals

The essence of this concept is that measurement of usability goals improves usability credibility and usability understanding for project stakeholders. The measuring of usability goals is done to gauge how well the project has stacked up against them. Measuring often produces qualitative data that, for organisations and project stakeholders with low maturity, can be seen as discretionary. In these cases, quantitative measures provide hard facts that enable gaining usability credibility and support of usability findings that leads to ratification of requested changes. The usability goals provide the core elements to the usability mindset for a project usually represent four to six usability goals, measured throughout a project lifecycle.

The setting of usability goals is important for the development of the usability mindset that will be used throughout the project lifecycle. The usability goals will provide guidance to the practice, increasing usability credibility and providing usability direction and focus for the project. The optimum number of usability goals for a given project is between four and six.These

usability goals help define the meaning of usability for a project. The articulation of the usability goals will consider the various project stakeholders goals, project constraints and other project elements. These goals need to be evaluated and measured, to understand to what degree the project has achieved the usability goals.

> *'Now the other thing that comes out of that is usually measures. And these might be, sort of, hard formal measures, quantitative kind of stuff or they might be softer more qualitative kind of stuff. Typically what we get asked to do is the more qualitative kind of stuff but we don't often get asked to do testing involving the clicks and ticks kind of approach. It takes you know 2 minutes 43 seconds as your benchmark and so on, we do do that stuff.' #08*

> *'Some requirements around how long we expected things to take in terms of minutes or seconds. So people were getting in there in three milli-seconds or whatever and that and need to be able to recognize X.' #03*

Often a usability practitioner will perform usability activities whose usability findings produce qualitative data, which is often viewed by other stakeholders as discretionary data. Organisations with low usability maturity may need quantitative data to see the usability value provided by usability activities to the project lifecycle. To organisations with a low usability maturity hard facts and figures are important to establish usability credibility.

> *'If you check our website about the results we have achieved, our case studies, results, there about thirty items which are 500% numbers. I want numbers, if I don't get the numbers, if I don't do it like this I won't get the numbers. To prove it, you gotta prove it, because people think this stuff is discretionary.' #16*

During the design phase of a development process, usability activities look to examine usability goals that may conflict and may require balancing or concordance of usability goals. After the design phase, the testing and evaluation phase can employ usability activities that can measure the usability goals of a design, highlighting tension (conflict) between usability goals.

> *'You often get conflicting goals around, say, you want to up-sell as much as possible, a goal about it being as fast and as smooth as possible for the user to get through their task. And often us up-selling these interrupting this and "what about this?" "Have you thought about that?" And then so you know you have like that, you start looking at the design, you look at the, well usually we do some testing, and you gauge the sense, the depth of pain of the user. Sometimes you got to businesses and say "yeh it's a little bit to*

inconvenient", but it's not going to freak them out and throw them off task and we are happy to wear that risk.' #03

The usability measure for a given set of usability goals[9] need to be able to demonstrate the level attained for the project. The measures taken can be used to demonstrate the effectiveness of a design, and can aide in, for example, the acceptance of a change in a design element. This can be especially helpful when there are multiple stakeholders with various levels of attachment to various elements of the design.

'When you're dealing with people who are extremely creative and they have real attachment to a design element, so if you can show them pretty unequivocally that it was ignored completely by everyone that looked at the site, then maybe don't be so attached to that design element, or move, or it may need more work.' #17

Sometimes measurements are not performed late in a project lifecycle because of organisations low usability maturity, the usability mindset can fall below the project radar and completing the project becomes more important.

"I think the problem is not if they agree to the goals really, a lot of times we have found that they don't measure them in the end. That's a problem, you set these nice little goals, and everything like that, then you come back to talk to the client, the year after, how are you going with the goals, 'oh we have forgotten to measure them!'." #18

There were eighteen usability practitioners who mentioned this concept. These contributions (sixty coded references) were predominantly made when discussing aspects of usability practice theme, with some related across the other themes. It was predominantly discussed during the good story (seven practitioners), bad story (eight practitioners) and typical day (nine practitioners) discussion, with some discussion across all other interview questions. This concept has a very strong base of support from practitioners interviewed.

This concept of measurement of usability goals is important to the usability practice, to establish or maintain usability credibility for novice project stakeholders and organisations with low usability maturity.

4.6.3. Maintain flexibility with usability practice

The essence of this concept is that flexibility in the performance of usability activities is needed to maximise the usability outcomes, especially when project constraints impact on the performance. Usability practitioners with the appropriate skillset and experience often exhibit this flexibility. They need to be able to pick the appropriate usability activity which, based on the project constraints, will maximise the value of the usability findings that will improve the usability practice.

Project plans need to be dynamic, especially when findings from usability activities are considered. The discussions with various stakeholders involved in a project may also reveal information that may impact the project plan.

> *'And you are probably a bit more dynamic, because you are probably defining the research agenda as you go more like you will do a bit of site visits and you will think, "that's enough site visits, how about we run a focus group now". So you would be chopping and changing your plan.' #01*

Sometimes the project lifecycle used by the organisation mandates usability activities or the project stakeholders override the usability findings.

> *'So they are mandating a lot of it, this is how we need to go, this is. Because of the politics, this is just how it needs to be.' #15*

There is a need to be flexible and dynamic in the selection and performance of usability activities throughout a project development process.

> *'That's the thing about trying to be too prescriptive, is that you can only prescribe for certain contexts. After a while you need to deviate, a test of a good methodology is whether or not it provides with enough information to be able to apply it, whilst being sufficiently flexible.' #21*

Usability practitioner needs to have the appropriate experience and skillset to know when usability activities need to change to accommodate changing circumstances in the project.

> *'I think the activities are important, but it's knowing and having the right skills set to determine when to use the right activity at the right time' #20*

There were thirteen usability practitioners who mentioned this concept. These contributions (thirty-three coded references) were predominantly made when discussing aspects of usability

practice theme, with some related across the other themes. It was predominantly discussed during the bad story (four practitioners) and typical day (seven practitioners) discussion, with some discussion across all other interview questions. This concept has a moderately strong base of support from practitioners interviewed.

Usability practice requires flexibility in performance of usability activities. This is needed in order to consider and mitigate problems encountered or project constraints inhibiting practice. The key is maximising the value of performing usability activities in a project, which may mean being flexible in selecting the appropriate usability activity for a given set of usability goals and project constraints.

4.6.4. Managing stakeholder involvement

The essence of this concept is that management of stakeholder involvement is an important role for a usability practitioner. It requires engaging the right stakeholders to get involved in various usability activities in different capacities. Primary users participate in the usability activities and are activity involved, which generates usability findings. IS project-team members are usually involved in an observational capacity, which needs to be controlled. Senior organisational stakeholders require presentation of usability findings to take them on the usability journey. All these project stakeholder engagements with usability activities need to be managed to provide each with a valuable usability experience that develops their usability mindset.

One of the roles of a usability practitioner is to manage stakeholder involvement in usability activities. Specialist recruiters can be engaged to enlist users for involvement in usability activities in the project. This management aspect of a usability practitioner's role is primary discussed, by practitioner interviewed, in relation to the attaining and facilitation ofthe involvement of project stakeholders.

> *'What do I do everyday? I mean stakeholder management is really important. I mean it always has been but there is much greater interchange or exchange between people in our team and stakeholders.' #07*

Involving IS project team members, in observation of various usability activities, throughout theproject lifecycle, helps make the usability issues real to them. This involvement may generate emotive responses or intrusive behaviour, which needs to be managed by usability practitioners.

'I worked once as a consultant on some tissue processing equipment with people from the lab. And we had to keep their programmer's mouths shut so they would watch what people were actually doing using prototypes of the interface they had designed. And you know you need to get these domain experts in, because programmers don't know the domain in a detailed way.' #04

There were eleven usability practitioners who mentioned this concept. These contributions (fourteen coded references) were predominantly made when discussing aspects of usability practice theme, with some related across the other themes. It was predominantly discussed during the good story (five practitioners) discussion, with some discussion across all other interview questions. This concept has a moderately strong base of support from practitioners interviewed.

This weaker concept highlights the additional overhead required during usability practice to manage the collaborative approach needed to achieve improve usability mindset for a project.

4.6.5. Evangelising usability to project stakeholders

The essence of this concept is the need for usability practitioners to evangelise usability within a project and across an organisation. Usability consultants predominantly sell usability at a usability activity level. Whereas an organisational-based usability practitioner will often be looking to evangelise usability in order to improve the usability maturity of an organisation and/or project stakeholders. Selling and/or evangelising is about improving the usabilityunderstanding to first enable acceptance of the value of usability for a project or organisation. Evangelising provides the first step on the road to development of a usability mindset.

A key role played by usability practitioners is to evangelise usability. It can be construed as selling, educating, training, influencing, improving understanding and making aware to all project stakeholders the concepts of usability. This evangelism role can often be described as that of a change agent, when evangelising usability you are trying the initiate change within the project and across the organisation. This change leads to a propagation and building of the usability mindset.

'One of the roles, and other team managers in my team, we have to sell the whole concept of usability, user centred design and accessibility in an organisation, which is

quite new to the whole concept. So a lot of our time is spent presenting, same idea, of why it's important; what else I can do for them.' #20

'[Usability evangelism] Oh, absolutely, we try not to miss an opportunity to let people know how we have contributed or let people know how we work and what tools we have access to. Because they may or may not have had much exposure and they may not understand that usability testing is different from UAT for example.' #06

'We are, in fact, change agents with what we do, especially working within an organisation.' #20

The interview participants indicated that it is important to have key project stakeholders, with vision for the IS, to embrace the usability deeply enough to champion it and their vision. A stakeholder, like a Business Analyst that gets involved in the usability activities, could shadow a usability practitioner, sharing the usability journey through involvement in all usability activities throughout the project lifecycle. This deep involvement provides the usability mindset to evangelise usability to other project stakeholders.

'The more successful projects I have worked on had a strong stakeholder that has a vision for a product and will get it through.' #05

'That this particular analyst and I shared that journey so she had a very good understanding of what it was and so it wasn't just [interviewed persons name] making it up. That in fact it came out of the stuff and here is why we need to do that. And so a year and a half later and we had been doing implementation staged versions and so on,she is the person on the team, now that I am no longer there, who A. knows why the division is the way it is. And then if trade-offs have been made, fine, she is in a much better place to do that; but secondly when they need more expertise then they know when to call me in. So I have been back once or twice with spot checks and so on and to give them some advice or something,' #08

It's accepted that the role played by usability practitioners involves the selling of usability to project stakeholders. This is specifically directed at selling the services of performing specific usability activities at various stages in a project lifecycle. This involves a more direct approach than usability education, and has more direct implication to usability consultants who need to generate consultancies.

'I support the sales team in their pre-sales activities, like writing proposals and attending meetings, and selling, selling proper.' #16

'One of the roles, and other team managers in my team, we have to sell the whole concept of usability, user centred design and accessibility in an organisation, which is quite new to the whole concept. So a lot of our time is spent presenting some idea, of why it's important, what else I can do for them.' #20

Improving the usability mindset through selling and evangelising usability can improve or increase the value placed on usability activities and the resulting usability findings. This is especially important to usability consultants whose main task is performing usability activities at particular points in a project lifecycle. Selling the idea of usability is about improving usability understanding of project stakeholders, to allow them to make informed usability decisions within an IS project.

'[Consultant] I will be mentoring some of the consultants in the company. But I think that the whole aspects of, I don't like using fighting words, the challenge of convincing people why this has to be done, as a consultant…' #20

'They say"we want to do some testing". "Actually I think it sounds like you want to do workshops instead", so I get to push them a bit there.' #18

Usability consultants find that organisations that engage them to perform usability activities are more usability aware. Occasionally they may need some usability sell or usability evangelism to increase or change the amount of usability activities performed within a project. Not all consultants have the skills or inclination to sell the concept of usability, but they have acknowledged it as a role performed by usability practitioners. The challenge of selling usability to stakeholders can be hard to do as a consultant, but performing a mentoring role can aid the evangelism.

'It's educating, it's telling them, evangelising is normally about selling the idea of usability, I was selling the things that they needed to understand to make good decisions. So by the time they got there they didn't undo our good work, by making decision that are not informed.' #19

'As consultants basically the work's sold to them, and you just need to go away and do that work.' #20

There are fifteen usability practitioners that discussed this concept. The contributions (thirty-nine coded references) were predominantly discussed in relation to usability practice theme, with eleven of these usability practitioners also discussing mindset theme (twenty coded references). It was discussed fairly evenly across the question asked during the interviews, but mainly in the

extra question about evangelism by five of the usability practitioners. This is a moderately strong concept for the usability practice theme.

This concept focuses on the key usability practice of evangelising usability, often to improve the usability mindset of project stakeholders. Usability consultants may call this selling because they are looking to generate consultancies but there is incidental development of the usability mindset. The organisational-based practitioners focus is more on the development of the usability mindset.

4.6.6. Skillset and experience of usability practitioner

The essence of this concept is that gaining an appropriate level of skills and experience improves the usability practitioner's performance. Experiencing a variety of domains, a mix of technological environment and a range of stakeholders provide usability practitioners a good base to enhance their social skills and know how. This experience also provides a comfort with ambiguity and flexible with performance and understand iteration required when performing usability activities, with due consideration for project constraints. Skills are obtained through education, practice or mentoring by a more experienced usability practitioner. Consultants may be used to satisfy skill or resource shortages in organisational usability team or to provide education.

The data on which this concept is based does not provide enough detail for a detailed list of usability practitioner skills. There are some broad skills: communication and fostering of relationships, being able to perform usability activities, being flexible in performance usability activities with consideration for usability goals and project constraints, and the ability to continually learn and adapt usability knowledge in a given context. A lot of these skills are heavily reliant on the usability practitioner building up experience in practice.

Usability practitioner learning focuses on providing the usability techniques and processes that are available to perform usability activities across a project lifecycle. Experience provides the flexibility and know-how to utilise the usability activities in the best way possible for a given project.

> *'It really also depends on the skill set of the staff involved in the process. We have varying levels of people, the outcomes usually do change, depending on who's involved in the project.' #12*

'I think the activities are important, but its knowing and having the right skills set to determine when to use the right activity at the right time.' #20

Communicating across organisation, project and activity boundaries of a project is an important skill for a usability practitioner. The people skills are important in developing the relationships needed to gain usability acceptance and stakeholder involvement.

'So many people get caught up in the quality processes, and forget about the people skills, when you go out to do a contextual inquiry, and you haven't got the communication skill which enable bonding to happening, which would affect your results.' #20

'They [usability activities] are all flawed. They're all not going to be appropriate in a given situation, so at the end of the day the most important thing is having expert people who know how to do their job, and having things such as collaboration, communication, and end-to-end involvement. Because if the process is falling apart, but you have experienced people, they'll do the job.' #21

When involvement by stakeholders is limited, it's preferred to have the usability practitioners to be the user advocates than to not have anyone considering the users. Sometime, budget constraints or timelines may restrict the stakeholder involvement, which leaves usability practitioner advocacy as the only voice for the user in the project. Being a user advocate is a required skill and role played by usability practitioners that requires knowledge and understanding of the primary stakeholders.

'This is my profession and I have had experience testing, working with users and I have seen some of the things that they commonly have trouble with. In some sense I do feel comfortable in being able to, say, look at the interface and hopefully give some thoughtful feedback. One of the things I always do stress is this is my professional opinion. But it is not till you can really sit it down in front of users and doing the more formal testing that you can really say,"this is what I think might be a problem but this is what people are actually having a problem with".' #14

Involvement in projects with different domains provides varying experiences for a usability practitioner. Even though a domain can be unknown to the usability practitioner, it provides an opportunity for greater involvement by the project stakeholders, to provide the domain knowledge. The usability practitioner brings the usability understanding and expertise to the project, rarely the domain knowledge.

'Working for a consultancy, the positives are, the variation in working. That's a big positive. You're doing work for financial institutions, for government agencies, for a private organisation, it's exciting and you broaden your skills a lot more. You therefore broaden not just your usability skills, but your people skills and political skills.' #15

'Occasionally I'll go to a client, and it will be like, "wow this is a complicated domain". We will have to work on this together, I can bring my expertise, but I don't make any pretence to know your domain better than you.' #17

'So, I reckon, no one likes that, I think that usability is a blacksmith art, and you need to smith with someone for, who knows, 5 year or 10 years, before you're labelled as a crack designer, even good designer, let alone an average or poor designer.' #16

Usability consultants have the opportunity to broaden their usability skills with exposure to different domains, different stakeholders and different organisational politics. Organisational-based usability practitioners tend to become more expert in the domain and organisational savvy. Their focus and experience is limited to the same domain[16], the same set of stakeholders and the same organisational politics. This limited experience base can impact on the usability outcome obtainable. Consultants have a better opportunity to gain a broad experience base.

'[Organisational UPs] some of these people work on one very big app for years. That's all they can think about, the legislations, the regulation, they don't become usability people anymore, from my perspective, they just become what we would call subject matter experts (SME).' #17

Often there is a need for a specific usability skill because it is lacking within the organisational usability team, which involves hiring a usability consultant to perform the skill, educate or mentor organisational practitioners. This demonstrates a higher level of usability maturity, when

[16] This limitation of domain, for organisational usability practitioners, is often broadened through involvement in various user experience associations, like CHISIG (2011) and UPA (2011), attending conferences (like OZCHI) and subscribing to newsfeeds, newsletters or publications in the usability area. This was mentioned by two of the organisationally based usability practitioners interviewed.

an organisation can identify a gap in the skills required to perform a particular usability activity for a project.

> *'[Work for internal usability team] it's because they're lacking a certain part of a skill set, a lot of time is because they're just too busy. People like [company name] will have their own team, they get so many projects in. Sometimes they have an overflow, so they contact us to help them out. Some other examples, it's just basically for their own training purposes, they want to see what we are doing differently to them…' #18*

> *'People who are often in-house don't have the specialist skills to design, to create a good product, because they don't have the specialist interface design skills or usability skills. So they don't necessarily always do good work. But consulting might have the specialist skill but don't get to do it deep, so that's not going to produce a very good usable outcome. Contractor can, because you can, because you can get both deep and use your specialist, you're hired as a specialist as a contractor, so you can go deep and use your skills.' #19*

> *'I can mentor people and build them up, and give them the skills and let them go. I am not going to run out of work, and by doing it I am not going to have any shortage.' #19*

Mentoring has been discussed as a great way of skilling up novice usability practitioners. Usability mentoring, by an experienced usability practitioner, can help question and refine one's own knowledge, performance and practice.

> *'I was working closely with one person, although it's a slightly extended team, but really close with one, in a mentoring style.' #19*

> *'The more you mentor, mentoring forces you to think about how you work, so you can explain to somebody else, so you can see what is happening in your brain.' #19*

Usability practitioners play an important role in influencing others with the usability mindset, mentoring other stakeholders in an IS project is one of the ways in which this can be achieved. The mentoring role is a key part of a usability manager's role.

> *'I also work with the staff to provide coaching, mentoring, advice, things like that.' #16*

> *'I am a senior as well, I have mentoring and coaching of others' #18*

> *'Being a manager of each kind of person, I don't get as much hands-on as I like. So I might be in a supervisory role of others that do that work, mentoring, but I try to get as much hands-on as I can.' #20*

There were fourteen usability practitioners who mentioned this concept. These contributions (sixty-three coded references) were predominantly made when discussing aspects of usability practice theme, with some related across the other themes. It was predominantly discussed during the good story (seven practitioners), bad story (five practitioners) and typical day (six practitioners) discussion, with some discussion across all other interview questions. This concept has a strong base of support from practitioners interviewed.

This concept is a key part of improving usability practitioner practice of usability when engaged in a project lifecycle. A highly skilled and experienced usability practitioner will be able to have a significant impact on usability practice that can enhance collaboration and development of usability mindset.

4.6.7. Validation of usability practice

The essence of this concept is that organisations and project stakeholders with low usability maturity will often look to external usability consultants to validate internal usability findings. They may also engage external usability consultants because their reputation is such that their opinion is held in higher regard than internal practitioners.

Usability consultancies often find themselves being employed to perform usability activities that have already been done by an internal usability team. This is done, because the organisation wants to validate the findings of the internal usability team, due to the lack of usability acceptance and the low value placed on usability. This validation can lead to higher usability maturity for the organisation, with improved usability credibility and acceptance of what their internal usability team does.

> *'I delivered a document to them last week. We really have not learnt anything new, but it's great to have it written down, and have it written down by external consultants because we have been saying this thing internally for a long time, and no one is listening to us because we are internal people. I think that's kind of common.' #11*
>
> *'In this organisation the IT group itself is not particularly well respected, or not trusted or valued, so anything that comes out of there, not quite dismiss it, but doesn't carry any weight. It must be really frustrating for those internal teams to be trying to do this sort of stuff without having that voice.' #11*

'It also depends on the skill of the consultant. Quite often the client will bring us on board, because its going to be a difficult project, they want an external party. They might have an internal usability team, and they will say,"we can't sell this to the business because they're not accepting internal advice, we need to go and pay a consultancy to come and tell us what we already know, in order to make it happen". It's very common.' #10

There were seven usability practitioners who mentioned this concept. These contributions (thirteen coded references) were predominantly made when discussing aspects of usability practice theme, with some related across the other themes. There was a limited discussion of this concept across all interview questions. All usability practitioners that discussed this concept are usability consultants. This concept has a weak base of support from practitioners interviewed.

The usability practice of validation of usability findings is a necessity to improve value and credibility of usability concepts and activities within a low usability maturity organisation.

4.6.8. Usability team practices

The essence of this concept is that performance of usability in a team improves the productivity of usability outcomes. The best group size being two usability practitioners or a usability practitioner and another IS project team member. Usability teams of two allows for mentoring of novice usability practitioners. A usability team can bounce ideas around and discuss usability findings, while an individual practitioner must rely on reflection and self-evaluation, time permitting. Usability teams may need to establish credibility within an organisation with low usability maturity or rigid project lifecycles. Allocation of usability team resources needs to be done carefully by usability managers.

Having other professionals involved in the usability activities, especially other usability practitioners can improve the experience base and expertise used to applying the usability activities and interpretation of the usability findings.

'Because you are working with other professionals, you have a bigger base for designer brainstorming. In a consultancy, where I guess when you're working internally usually your team is a bit smaller, so you may be limited on how much conceptualisation you can do.' #15

'Especially if you're a lone practitioner, worst thing is being a lone practitioner, you just don't know. You think you're good, you think you're great, you don't question it.' #16

To get the usability team accepted within an organisation requires the taking of small steps to improve their credibility and the organisation's usability maturity. As usability begins to gain traction within the organisation the more usability activities are performed and the more accepted the usability findings.

'Even though we can't achieve what we want within the first project, because within the organisation, we see these people all the time, so the next set of projects that come around, you see the same lot of people running it. And because they're starting to get the idea of what we are trying to do, it means that next time around it's a lot easier" #20

Usability performed by an individual practitioner requires more self-reflection on the performance of activities and the understanding of the usability findings. Often project constraints limit this reflective time. Working in a team can improve this reflective time with brainstorming and discussion among the team members.

'Even when we are on our own, you still need the time on your own to be able to reflect and to, kind of, define and create. It's a creative job; you are a designer you are…. Its like being a koala, you need your own time to do whatever you do and then you need be able to bounce ideas, or you get information from the client or the users or the developers sometimes.' #13

Where a usability team is involved in a project the members are normally creative and are comfortable working in a multi-disciplinary team. Typically, most usability projects involve a minimum of two usability practitioners, from the start of the project, working on all the usability activities. Working in a team of two or more practitioners, on usability activities, can enhance the usability outcomes for a project. At least one of the usability team should be a usability practitioner. The other member of the usability team can be another project team member, being mentored in usability concepts and hence developing a usability mindset.

'Typical in design it is as a team. That is the best way to do it, without a doubt. I have done it all sorts of different ways and even just two people in a room is way better, is more than twice as good as one person." #01

'A team of two does all of the stakeholder analysis and research at the start. Analyses all of that and presents it all back and makes sure it is all above board. We then go talk to customers. End users of the product we are trying to develop and go through that

process that is still in a team of two. Analysis is a team of two. The documentation, when you get to the design you are going through that, is all done in a team of two.' #02

'From my experience, it works much better when two of you are working. You work much faster and you also, you are much more creative when you work with somebody.' #13

A small project typically can only afford specific usability activities to be performed by a usability consultant, or have one usability practitioners. Medium or large organisations are in a better position to afford a team of usability practitioners.

'For a smaller project one person would probably be doing it all. For a smaller project that we need to be resourced up with peak designers that have one or just one of those skills then they will maybe work together. But it might be like we do the interaction design first and then somewhere towards the end the visual designer will come in. For our larger projects then it is more a team-based approach but probably the greatest number of designers on a project would be four.' #05

In allocating to a project, usability practitioners that are part of an organisational usability team, one needs to be careful in considering the expertise in relation to the usability activities performed and consider when to be involved during a project to maximise the usability outcome.

'We only have a small assessment team with only about 8 of us and one of those people at the moment is on iterative usability testing and back end sort of stuff, he is not up the front so we have to be very careful about where we allocate our resources.' #02

A usability team provides a better opportunity to mentor novice usability practitioners with usability skills and experience. Working in a team also allows for a consistency and quality in the usability outcome for a project, through the collaboration that can occur.

'It is a very, sort of, easy collaborative team that we have here, so people are very willing to share information. We sit together, which is really important. You know people "hey what do you think of this". #05

'That means when we coach people, it is structured and disciplined, which means if I get any of my team to design something, it might be 70-80% similar. Well that's boring! Well actually its consistent and quality. So I know what I am going to get at the other end, which means the client is going to know what their going to get at the other end and they could pick anyone to do. Sure, there is going to be differences in experience levels, but fundamentally it's very robust and it's working very very well.' #16

There were sixteen usability practitioners who mentioned this concept. These contributions (fifty-six coded references) were predominantly made when discussing aspects of usability practice theme, with some related across the other themes. It was predominantly discussed during the typical day (nine practitioners) discussion, with some discussion across all other interview questions. This concept has a very strong base of support from practitioners interviewed.

Usability practice can be enhanced if a team of usability practitioners can be resourced for a project to handle the usability activities, the involvement required and the development of a usability mindset.

4.6.9. Demonstrate value in engaging usability practitioners

The essence of this concept is that usability practitioners need to show the value of usability to project stakeholders. Performing usability activities that will provide the most usability 'bang' with generated usability findings does this. The usability activities need to provide an opportunity for project stakeholder involvement to allow them to see the value of usability.

Engagement of usability practitioners in a project is often done to tick a box in the project plan, or to do a limited engagement for a single parcel of usability work. Often there is no vision for the design and/or usability for a project. Many usability consultations are the result of one of the stakeholders in the project recognising the value in performing usability or at least one specific usability activity. Getting project stakeholders to see the value of incorporating usability into their project is an important first step.

> *'We were brought in, being user interface interaction designers, we were bought in because the project manager saw that there wasn't a vision for how this thing was going to behave on screen.' #01*

It is not the performance of any one activity that provides value to the client. It's the usability outcomes and the development of the usability mindset that provide the client the true usability value. The usability value of performing a usability activity must be apparent before it's done, flexibility in performance is important in order to maximise usability value.

> *'It's about understanding why we will be doing something, and for me the biggest thing as a practitioner, is why are we doing something. Are we really adding value by doing*

this?Sometimes yes, sometimes no, it's not the best job so you might try something. So, that methodology is a framework for us to work with.' #20

'All the stakeholders were all really into the idea of creating a usable intranet. So the difference between those two questions, the make or break thing, whether a project will enjoy success or not is how much the organisation is behind the idea of user centered design." #10

Involvement of any or all stakeholders will provide them an opportunity to understand the nature of usability's value. This is a two-way street, where the stakeholders benefits from the seeing and believing the value of performing usability, and their involvement can further enhance the usability quality of the IS project's outcome.

'One of the things we always really tried to do where possible was, we tried to set up sessions so that we could have another usability practitioner from the team actually sitting in with a number of observers in the room and actually allowing them to view the session, take notes and just discuss with the usability person what was going on, where the usability issues were being highlighted in the testing.' #14

There were ten usability practitioners who mentioned this concept. These contributions (eighteen coded references) were predominantly made when discussing aspects of usability practice theme, with some related across the other themes. It was predominantly discussed during the good day (five practitioners) discussion, with some discussion across all other interview questions. This concept has a moderately strong base of support from practitioners interviewed.

Part of usability practice is to provide a value to usability engagements, allowing project stakeholders to get a sense of the value of usability activities and the value of engaging usability practitioner. This is an important first step in establishing a usability mindset.

4.7. Conclusion

This chapter has presented usability practitioner attributes and twenty-seven key concepts that have emerged from the analysis performed as part of this research that contribute to a theory that answers the research question. This set of concepts have been further analysed in the next chapter (Chapter 5), where they have been grouped into common themes, relationships between them have been derived and comparisons made against practitioner attributes. The concepts presented in this chapter are analysed further, a theory is derived and presented in Chapter 5.

This theory has been compared and contrasted against various literatures in Chapter 6 that has been discussed in Chapter 2and supports concepts discussed in this chapter.

CHAPTER 5

5. Analysis and Theory Development

This chapter provides an analysis and development of the concepts derived from the research data, discussed in chapter 4. The analysis and development of concepts reveal a theory that addresses the research question, discussed in chapter 3. The outcomes of this chapter have been compared and enfolded using the literature in chapter 6. This chapter will form the basis of the conclusion discussed in chapter 7.

This chapter will focus on further analysis of the concepts presented in chapter 4. This chapter will demonstrate the key elements of the theory development that have emerged from interview data. The emergence of the four major themes has been discussed along with the grouping of concepts that shape them. Relationships between the themes have been examined and the relationships between the concepts and other demographic attributes identified in the data. This chapter's focus on relationships provides the basis for developing theory. This process forms the basis for the selective coding step in the research plan, as discussed in the methodology chapter, in Section 3.6. These building blocks (i.e. themes, concepts, and relationships) will form the theory that answers the research question presented in Section 3.1, which in essence will provide guidance to improving the usability outcome in IS projects.

The body of this chapter will provide various lenses on the interview data that will highlight the examination that has occurred to develop the high level concepts, these include:

- Analysis of each concept group, i.e. theme, and prioritise them from strongest to weakest
- Comparison of the themes and concepts across the interview questions
- Analysis of strong relationships between the concepts and themes
- Analysis of strong relationships between the demographic attributes and the concepts

In this chapter the discussion of relationships between various concepts and attributes coded from the interview data have been described based on the strength of the relationship. This relationship strength is based on two aspects, firstly on the number of sources (interviewed usability practitioners) who said something about the concept and then the quality of the discussion about the relationship was considered when examining its strength. Table 5-1 can be used as a guide to help recognise the strength of a discussed relationship. The weight of numbers that discussed a concept, or alluded to a relationship between concepts by discussing them within contribution, is used to highlight something of interest to this research and hence help answer the research question. In most of the cases examined, key usability practitioners interviewed supported the relationship, with strong contribution in support. The number of sources was not the only consideration made on strength, but it provided a starting point.

Strength	Sources[17]
Very Strong	16-21
Strong	10-15
Moderate	5-9
Weak	1-4

Table 5-1: Inter-concept relationship strength legend

The concluding parts of this chapter will draw on the comparisons and analysis presented in this chapter to generate a theory grounded by the interview data, derived concepts, themes and significant relationships identified by this research. The theory that emerges from this analysis has been enfolded with the literature, in Chapter 6, and then presented in the conclusion, in Chapter 7.

[17] Sources refer to the number of interviewed usability practitioners.

5.1. Theme discussion

The themes have been derived by grouping concepts, discussed in Chapter 4, with a common thread. This section will examine and compare the concepts that relate to the themes, providing evidence on prioritisation of the strongest theme to the weakest theme. Each of the four themes has been discussed in this prioritised order in this section, but first a discussion on the prioritisation.

Figure 5-1: percentage of coded references for each theme

The majority of coded references[18] focused on the usability mindset theme, with the least coded references in the project constraints theme. The four themes in this research were well represented, based on the number of coded references from the underlying interview data (see

[18] A coded reference relates to a contribution made during an interview by a usability practitioner about a concept of interest to this research.

Figure 5-1). When examining the relationships between the coded references across the four major themes a few interesting facts emerge.

The ‘Usability Mindset’ theme is related to each of the other three themes very strongly based on coded references (see blue shaded cells in Table 5-2). These three relationships are the top three relationships among the four themes. The other relationships are significant[19] but are not as strong as the relationships linked to ‘Usability Mindset’. There was one usability practitioner in each of these three relationships who did not comment on the usability mindset theme. There were two practitioners in total, whose discussion did not focus on usability mindset theme.

- The first usability practitioner, made no comments in two of the usability mindset relationships and only two coded references in the third relationship. On reflection, this practitioner has had many conversations with this researcher in the past. Therefore the detail provided was superficial and answered the interview questions simply, because conversation started where the others had left off. This is a very experienced usability practitioner.
- The second usability practitioner was predominantly focused on performing evaluation type usability activities. Even though they have been working with usability in the one organisation for a number of years, there was limited scope to move beyond usability evaluation activities because of the organisational process employed.

Both of these usability practitioners are organisational based, and part of very large organisations. The organisational culture and constraints impact significantly on how much ground can be gained from a usability mindset perspective.

[19] By significant this statement refers to the other relationships between themes also having very strong links between them, as show in Table 5-2.

	All Themes	Collaborative Approach	Project Constraints	Usability Mindset	Usability Practice
All Themes	21 (630)	21 (240)	21 (208)	21 (312)	21 (277)
Collaborative Approach		21 (240)	17 (45)	20 (124)	19 (77)
Project Constraints			21 (208)	20 (101)	17 (47)
Usability Mindset				21 (312)	20 (130)
Usability Practice					21 (277)

Table 5-2: Number of related sources and coded references for each theme

The relationship between sources and coded references, along with the percentage of coded references across the themes, all point to the 'Usability Mindset' being the major theme for this research. Based on the representation by the coded references and sources presented in Figure 5-1 and Table 5-2, it suggests the following theme priority:

- Usability Mindset
- Usability Practice
- Collaborative Approach
- Project Constraints

Later discussion also corroborates the importance placed on these themes and the relationships between then (see Figure 5-2). The following discussions will also provide analysis of the concept groupings for each theme. It will highlight the importance of each of the themes to the answering of the research question, which in essence is what improves the usability outcome for an IS project.

Figure 5-2:Major themes and relationships that influence the usability outcome for projects.

Each of the major themes have a group of related concepts that describe important aspects or activities that impact on that theme, which ultimately impact the usability outcome for a project, see Figure 5-3. The concepts within each theme define the essence of the theme. The concepts group also predominantly relate closely to each other. This has been explored in more detail later.

- Usability Mindset - seven concepts
- Usability Practice – nine concepts
- Collaborative Approach – five concepts
- Project Constraints – six concepts

Appendix D provides a summary of the number of sources and coded references for each of the concepts and compares each concept with every other concept. It provides a cross reference

between the twenty-seven concepts. This appendix is used as a guide to identify and evaluate key relationships among the concepts, identify theme groupings and relationships between the themes. The strength of the relationships (based on Table 5-1 presented earlier) is used to highlight those relationships that may have an impact on the usability outcome and hence help answer the research question.

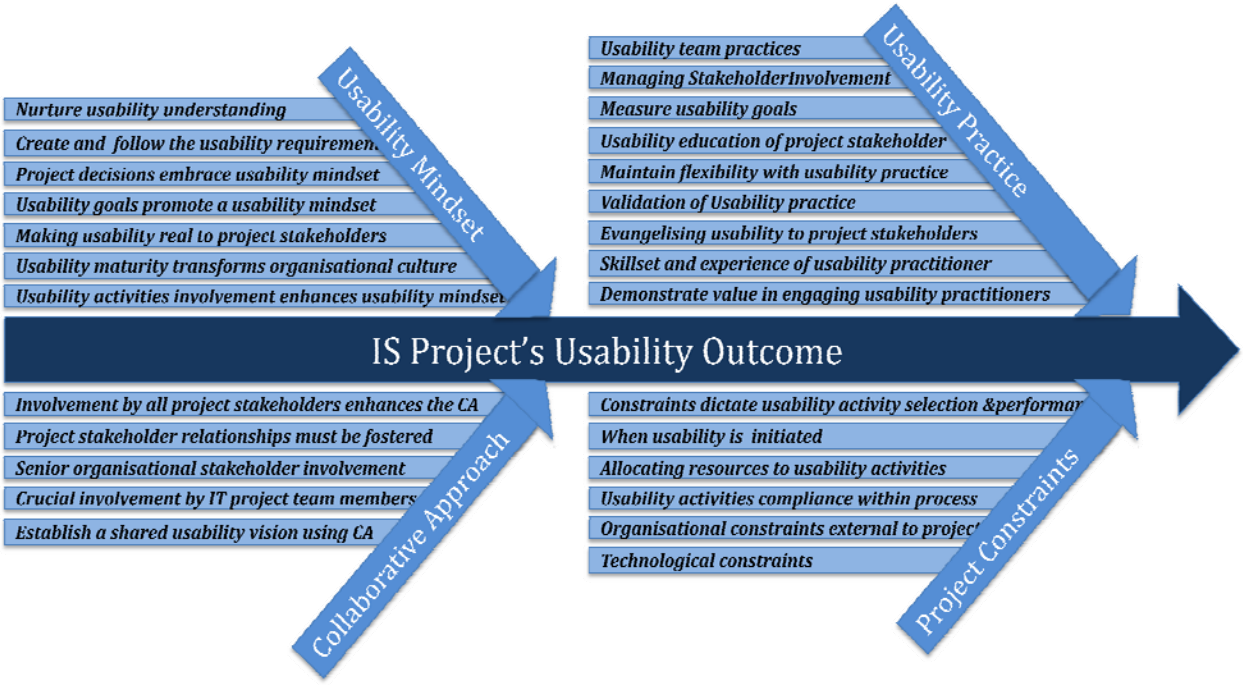

Figure 5-3: Project's Usability Outcomes impacted on by four themes and related concepts

The following sections will provide a discussion about the essence of each of the four major themes for this research. This discussion will incorporate the key ideas behind each of the concepts grouped with the theme, as shown in Figure 5-3. The essence for each theme will provide a high level conceptual view of the theme that will underpin the theory generated in this research. Each theme has been followed by a discussion of any strong relationships between the concepts grouped within the theme. This will provide the rationale for the four concept groupings created in each theme.

5.1.1. Usability Mindset

A usability mindset provides project stakeholders with the value, understandings, shared vision and maturity needed to make appropriate project decision that considers usability issues. The attaining of this usability mindset is staged and mediated by a usability practitioner through involvement in usability activities.

Creating a set of usability requirements, which includes the articulation of a small set of usability goals, promotes a core set of items that define the projects usability mindset. This shared usability vision (usability requirements) needs to be sold or evangelised to the project stakeholders for them to understand the usability value. Alternatively, the stakeholder could be mentored or educated in usability concepts to improve their usability understandings of the value of usability. In either case, the project stakeholder's involvement is imperative to make the usability real to them and engage them in usability activities. Ultimately, the shared usability vision for the project develops into a usability mindset that enables appropriate usability decision-making that impact on the project and beyond the project to transform the organisation's usability culture.

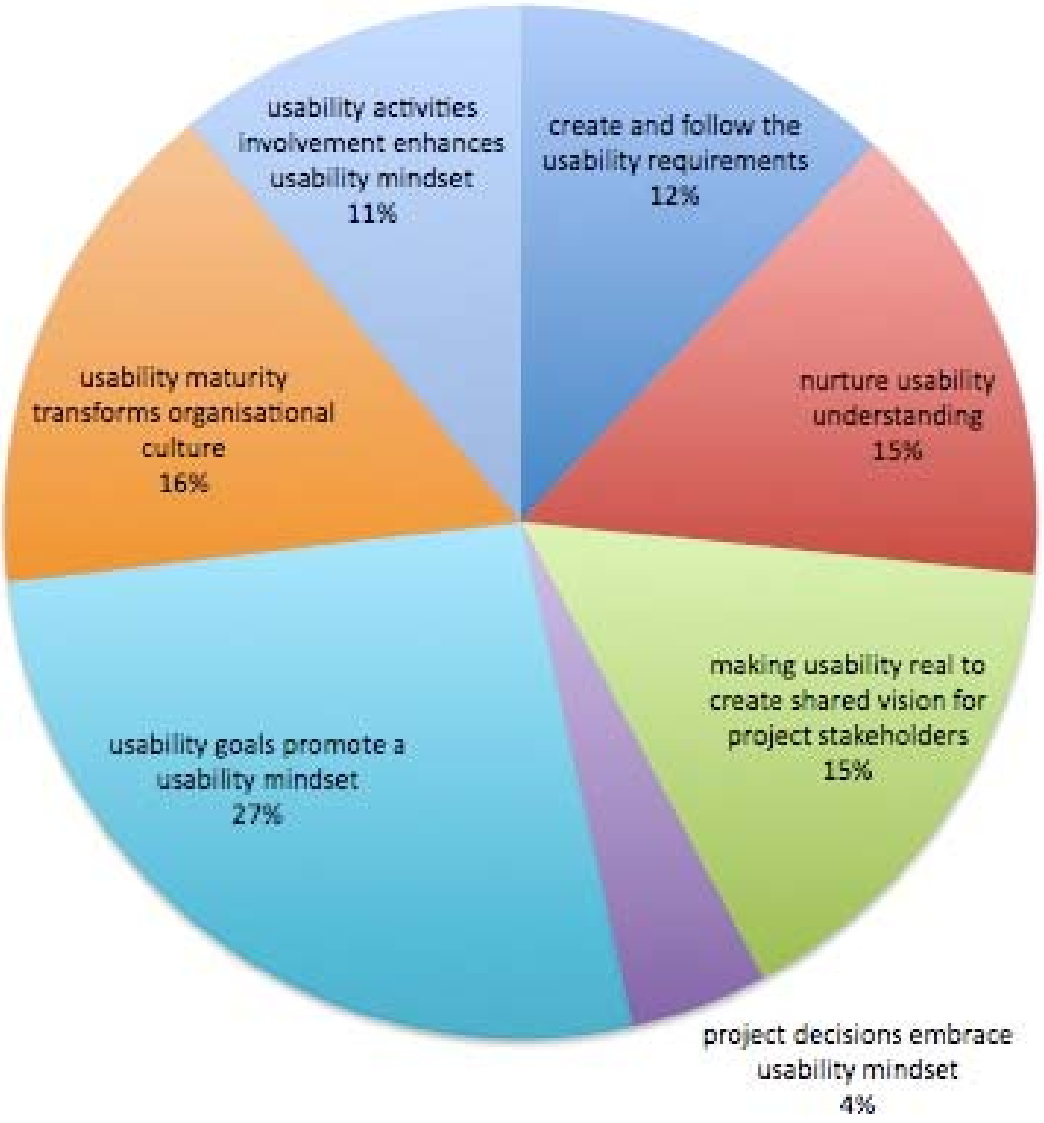

Figure 5-4: Usability mindset themes set of concepts, showing the percentage of coded references

The lesson learnt from this theme is that building a usability mindset across the range of project stakeholders can significantly improve the usability outcome for the IS project. This usability mindset may start off with a basic understanding of usability value, but it is preferred that a shared usability vision for the project be developed across the range of project stakeholders. Better still, the development of a broader usability mindset can be utilitised beyond the project and across an organisation. This progression of usability understanding can be predominantly built best through project stakeholder involvement in usability activities.

The main concepts for this theme, shown in Figure 5-4, include ‘Usability goals promote a usability mindset’, ‘Making usability real to create a shared vision for project stakeholders’ and ‘Nurture usability understanding’. These concepts factor heavily in the significant relationships

discussed later, in Section 5.2. The following sections will discuss the concepts and relationships between concepts for the usability mindset theme.

5.1.2. Usability mindset concept group relationships

The seven concepts within the usability mindset theme correlate very well together, with twenty-one possible relationships between the concepts. Of these relationships three are strong[20] relationships, six moderate relationships, and eleven weak relationships. The perspective of these concepts has a common theme that provides various ideas to consider in trying to achieve and improved usability mindset for a project.

The concepts within this theme are not orthogonal to each other. There is a sequencing that can be determined, when examining each concept and relating them to each other. For example, the 'Usability activities involvement enhances usability mindset' concept is done during the project lifecycle and leads to the 'Making usability real to create a shared vision for project stakeholders' concept. This sequencing of concepts identifies how concepts support other concepts in enhancing each other (see Figure 5-5), ultimately improves the usability outcome for a project.

The figure (Figure 5-5) presented here does not provide a recipe for developing a project usability mindset, but more of a guide to the concepts that may relate to another concept. The relationships (i.e. shown as arrows) show the strength of the relationships between concepts and the analysis of the interrelated concept memos. It provides a progression in usability understanding where continually nurturing it is a fundamental role played by usability practitioners. It also highlights stages of understanding and progression required in order to develop the usability mindset. There are two significant relationship concepts within this theme, where the relationship between the concepts is strong. The following two sections discuss these two relationship concepts.

[20] This strength indicator refers to Table 5-1 legend that provides a gauge of the weight of numbers discussing a relationship.

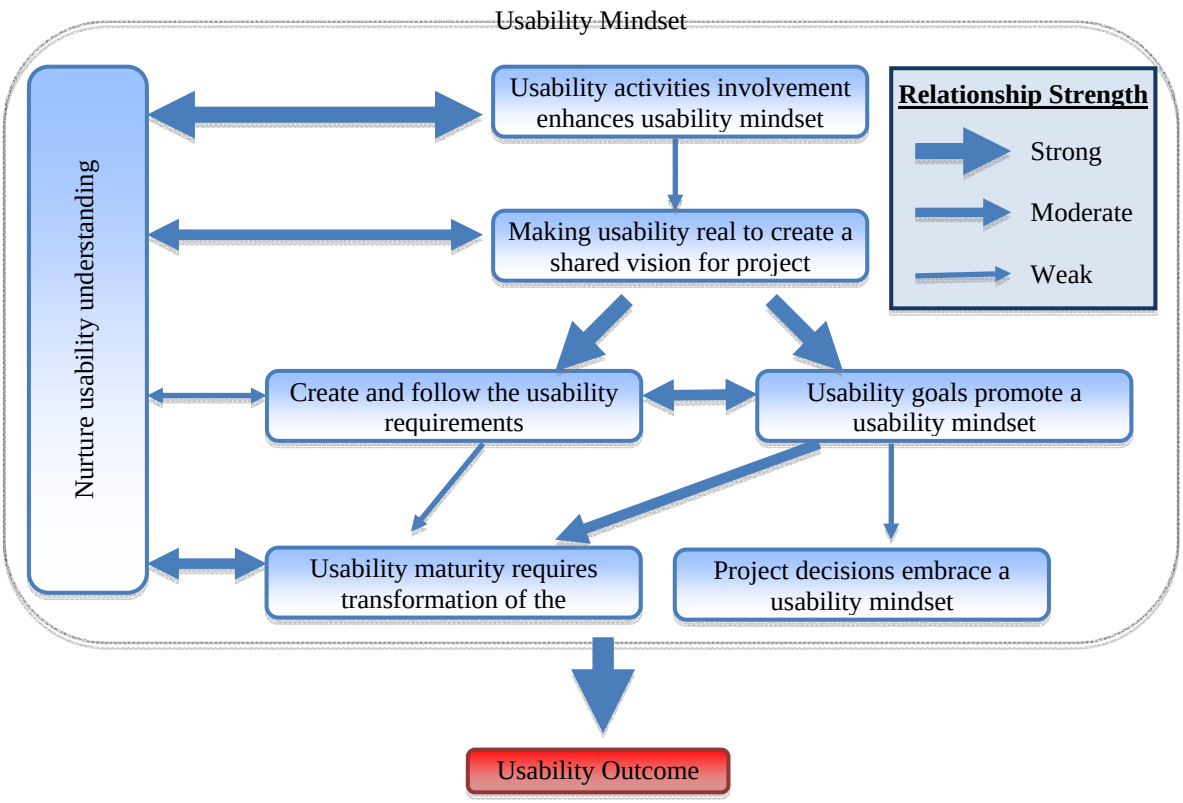

Figure 5-5: Usability Mindset concepts impact on usability outcome

Making usability goals real in project improves usability mindset

This relationship concept is based on a strong relationship between the concepts 'Making usability real to create a shared vision for project stakeholders' and 'Usability goals promote a usability mindset'. The essence of this relationship is that articulating the usability goals, for a project, is preferably done in consultation and with involvement of the project stakeholders. This allows the project stakeholder to understand the potential conflict in a set of usability goals that are made real through their involvement. This also gives them an understanding of why and how concordance of usability goals has been reached. This provides stakeholders with a real understanding of issues across the project. The interview participants found that it is important to place the usability goals and the reasoning behind their concordance and

prioritisation, in a usability document that provides a memory of the shared usability vision for the project. This usability document can be and should be consulted throughout the project lifecycle.

Usability Activity involvement makes it real and nurtures usability understanding

Involving project stakeholders helps make usability real and hence improve the usability understanding. The usability understanding gained through involvement can grow beyond recognising the value of usability to an understanding of usability. This higher-level usability understanding provides a project usability mindset, for project stakeholders involved. This relationship concept is made up of two (2) strong relationships within the usability mindset theme concept group.

The first strong relationship is between ‘Usability activities involvement enhances usability mindset’ and ‘Making usability real to create a shared vision for project stakeholders’ concepts. The essence of this relationship is that making usability real to project stakeholders is done through involvement in usability activities. Making it real allows project stakeholders to see the usability value, it’s a form of usability selling, which is done mainly through observation of participatory usability activities. It is only when project stakeholders actually see it in use that they may start to understand the concept of usability. This allows the forming of a usability mindset for the project.

The second strong relationship is between ‘Usability activities involvement enhances usability mindset’ and ‘Nurture usability understanding’ concepts. The essence of this relationship is that nurturing usability understanding improves the usability mindset where stakeholders know and seek the performance of usability activities because they have seen the value of usability. Involvement in usability activities is a powerful mechanism to nurture usability understanding and acceptance of the project usability needs. Usability consultants find it hard to obtain involvement in order to nurture usability understanding (see Section 5.3.3 for discussion). Usability understanding by the project stakeholders makes the performance of usability activities easier and improves usability findings, which further improves usability mindset and usability outcomes.

The lesson to be learnt here is that making usability issues real during involvement in usability activities allows a greater usability understanding to be nurtured. The benefit gained through this understanding helps promote a usability mindset for the project that ultimately improves the usability outcome. The project's usability mindset is not just for the usability practitioners to know and understand, it's for all project stakeholders (as discussed in Section 5.2.8).

5.1.3. Usability Practice

The usability practitioner has the primary responsibility for the usability practice within projects and organisations. The concept group (see Figure 5-6) that make up this usability practice theme describe two key foci for usability practitioners. Firstly, this research highlights various roles played by usability practitioners in a project that can include the education, mentoring, evangelising of usability and usability activities to project stakeholders. It can also include management of project stakeholder involvement and measuring of usability goals for a project. Secondly, the research shows that continual improvement of the usability practice of a usability practitioner's skillset and effectiveness in performing usability activities in a project. Work in a usability team can improve their usability skillsets, building their usability experience base and provide experience in being flexible in performing usability activities.

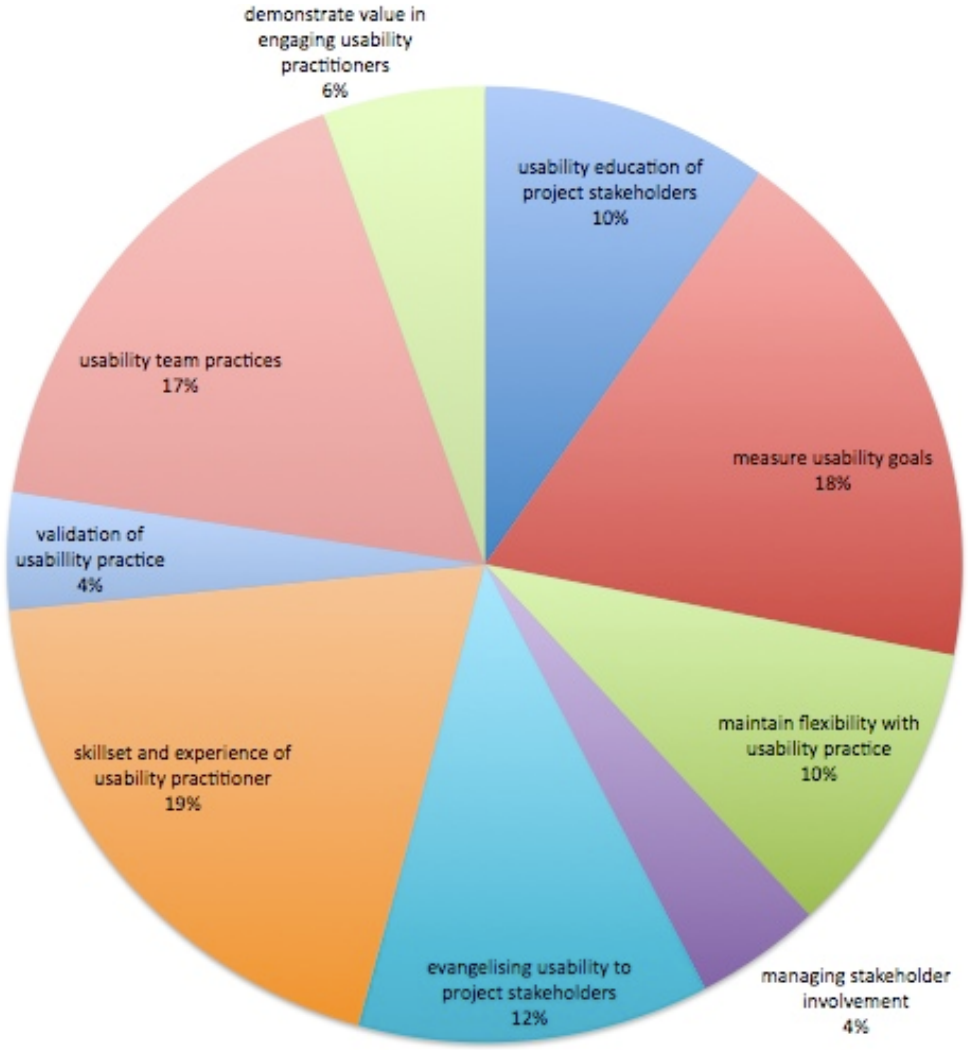

Figure 5-6: Usability practice themes set of concepts, showing the percentage of coded references

The lesson learnt from this theme is that the role of the usability practitioner is extremely important to a project's usability outcome. The major role played by usability practitioners is eliciting, measuring and concording usability goals within a project in collaboration with project stakeholders. To be effective they need to sell or evangelise the value of usability to project stakeholders. The key aspect of effective performance of usability activities is the skillset and experience of usability practitioners and working in a usability team of at least two. Part of performing usability activities is to be flexible in applying the usability technique.

The strongest concept is 'Skillset and experience of usability practitioner', but 'Measuring usability goals' and 'Managing stakeholder involvement'also factor strongly in the significant relationships discussed later, in Section 5.2. The following sections will discuss the concepts and relationships between concepts for the usability practice theme.

5.1.4. Usability Practice concept group relationships

There are nine concepts within the usability practice theme that means a possible thirty-six relationships between the concepts. Of these relationships none were strong relationships, two moderate relationships, and eighteen weak relationships. This grouping provides a distinct grouping of ideas that describe various specific aspects of usability practice. They are largely unrelated and not discussed in the same contribution during the interviews with usability practitioners (see Figure 5-7). Discussions of usability practice concepts are sparsely discussed across the interview questions and across the other themes.

The group of usability concepts for this theme highlights a list of important usability practitioner roles. Another group of concepts related to usability practices can improve the effectiveness of a usability practitioner (see Table 5-3).

Role based practices within a project	Practices to improve effectiveness
Usability education of project stakeholders Measuring usability goals Managing stakeholder involvement Evangelising usability to project stakeholders	Maintain flexibility with usability practice Skillset and experience of usability practitioner Usability team practices Validation of usability practice Demonstrate value in engaging usability practitioners

Table 5-3: Usability practice concept group perspectives

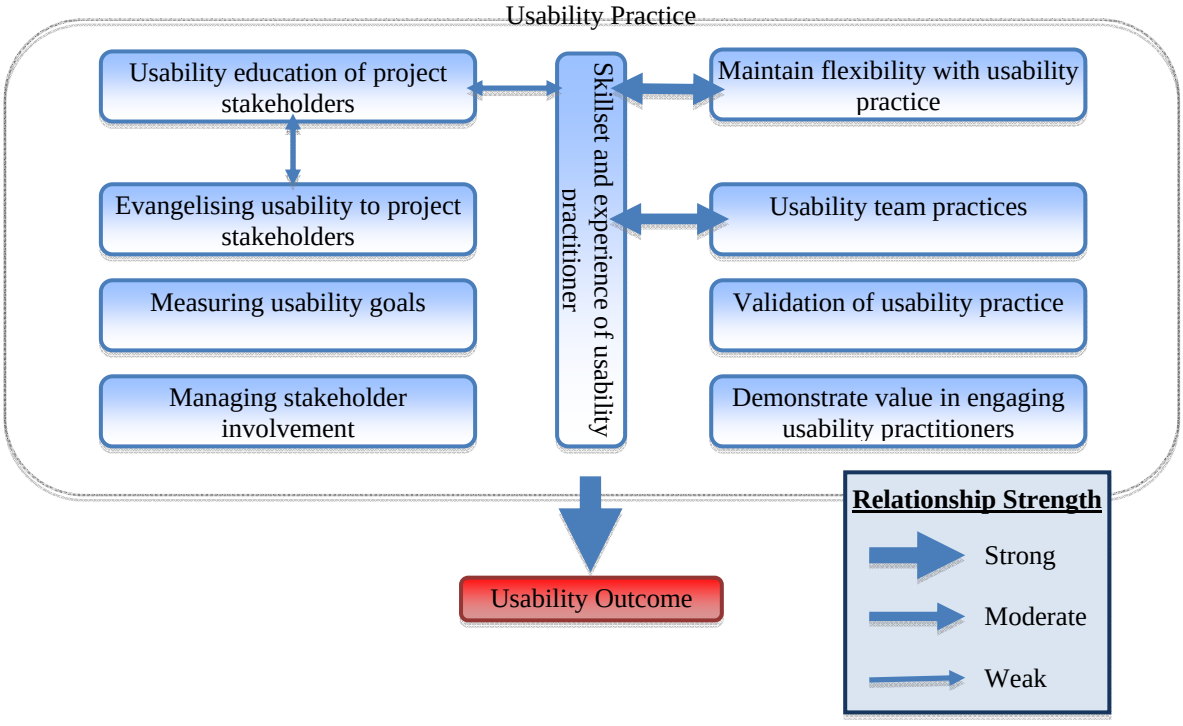

Figure 5-7: Usability practice concepts that impact on the usability outcome

The role-based practices focus on tasks that will improve the performance of usability activities during a project lifecycle. These include concepts such as measuring usability goals, education and evangelising usability to project stakeholders, all of which nurture the usability understanding and mindset. The managing of stakeholder involvement is an important role in fostering relationships and maintaining involvement in a collaborative approach.

The practices that improve the effectiveness of a usability practitioner's role provide a different perspective of usability practice. These include concepts such as the skilling up of usability practitioners through, for example, mentoring or working in teams. Increasing experience to allow for flexibility needed in the performance of usability activities, to be able to adjust performance to be more effective at generating improved usability findings. Usability practitioners must be able to demonstrate the value of engaging a usability practitioner. The value and importance of engaging them should not be underestimated for a project. Finally, the validation sometimes needed from external usability consultants, or the limitation encountered when performing usability activities as a usability consultant all present ways of identifying aspects that can improve the effectiveness of a usability practitioner's role.

There is one moderately strong relationship concept in this theme that has been discussed in the next section.

Skillset, experience and team environments

This moderately strong relationship concept is based on a relationship between concepts 'Usability team practices' and 'Skillset and experience of usability practitioner'. The essence of this relationship is that a usability practitioner's skill and experience is enhanced through multiple project engagements and working withother usability practitioners (a usability team). Multiple project engagements with various domains and a range of different stakeholders, provides experience that can enhance usability. This experience enables flexibility in the performance of usability activities to maximise the usability value and usability findings generated. The usability team environment allows for broadening of usability skillset and experience, especially from a consultancy organisation perspective. This breadth of experience enables a better performance of usability activities in the same domains and across to new

domains. An organisational usability team may need to engage usability consultants to bring in additional or missing skillset needed by team. Working as a lone practitioner in an organisation may result in being compartmentalised in doing the same usability activities, within the same domain and set of stakeholders, not allowing for growth as a usability practitioner. Usability practitioners predominantly discussed the value of a usability practitioner's skillset in a management capacity (see section 5.3.2 for further analysis). This relationship concept is an important relationship that highlights the value that needs to be placed on a usability practitioner's usability skillsets, experience and the value of working in teams to enhance the performance of usability activities that leads to an improved usability outcomes.

5.1.5. Collaborative Approach

A collaborative approach describes involvement by all project stakeholders in the usability activities performed in a project. This involvement could take on various forms. These may include active participation in the usability activities or observation of usability activities or listen to a presentation of usability findings. It is especially crucial for IS project team members and senior organisational sponsors to be involved. The involvement may incur resistance by the stakeholder or the stakeholder's manager, but needs to be mitigated to get all stakeholders involved. Relationships with the various project stakeholders must be fostered to get continued involvement throughout the project. Ultimately, this involvement will establish various levels of usability understanding.

The lessons learnt in this theme are three-fold: first, the fostering of relationships with project stakeholders is crucial to effective collaboration; secondly, involvement by all project stakeholders is an important way of gaining usability acceptance; thirdly, involvement enables establishment of a shared usability vision for the project that can change and adapt through a collaborative approach.

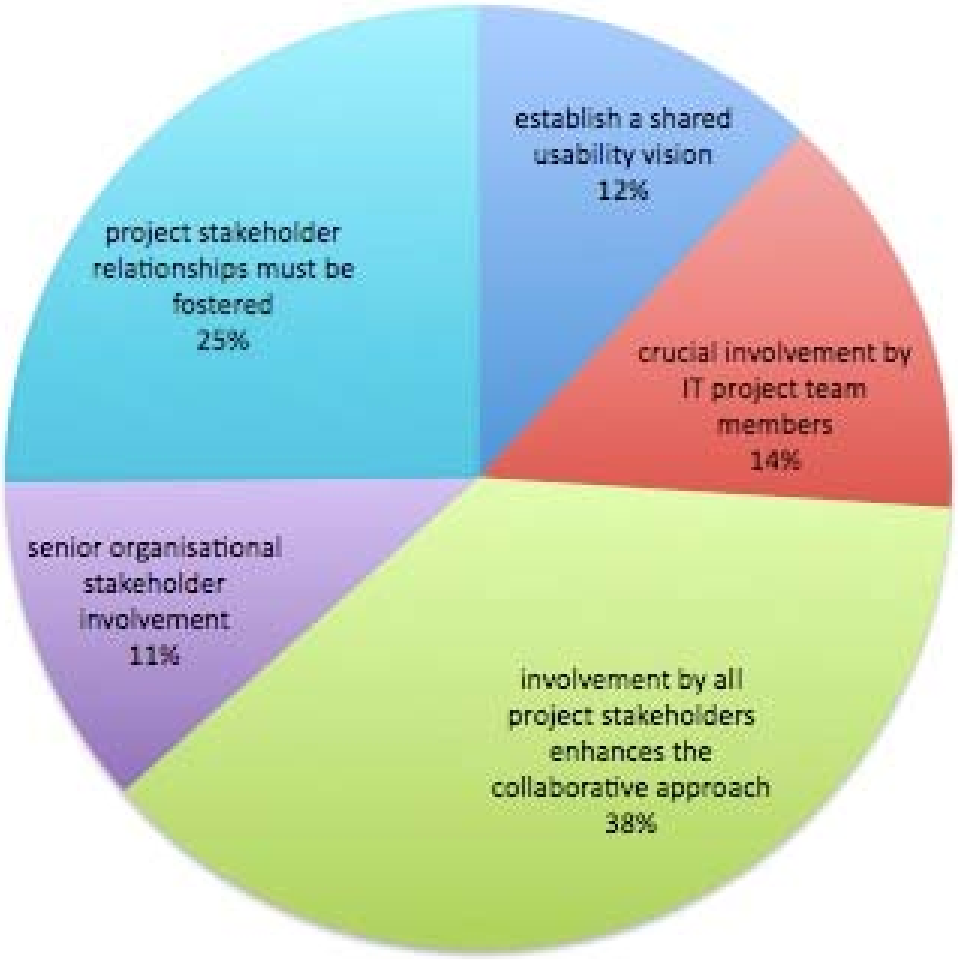

Figure 5-8: Collaborative Approach theme set of concepts, showing percentage of coded references

The predominant concepts of this theme are the 'Involvement by all project stakeholders enhances the collaborative approach' and 'Project stakeholder relationships must be fostered', as shown in Figure 5-8. Both of these concepts factor heavily in the significant relationships discussed later, in Section 5.2. The following section will discuss the concepts and relationships between concepts for the collaborative approach theme.

5.1.6. Collaborative approach concept group relationships

There are five concepts within the collaborative approach theme that means a possible ten relationships between the concepts. Of these relationships four are strong relationships and six moderate relationships. These describe a group of concepts that are highly cohesive with each

other as a theme. Based on the concepts a sequence (shown in Figure 5-9) can be ascertained to guide the improvement of collaboration in a project.

The concepts grouped with this theme can be sequenced to describe mutual relationships that impact a project's usability outcome. A concept such as 'Project stakeholder relationships must be fostered' is a precursor to the 'Establish a shared usability vision' and 'Involvement by all project stakeholders enhances the collaborative approach' concepts. The concept 'Involvement by all project stakeholders enhances the collaborative approach' needs a higher focus in regards to 'Crucial involvement by IS project team members' and 'Senior organisational stakeholder involvement' concepts.

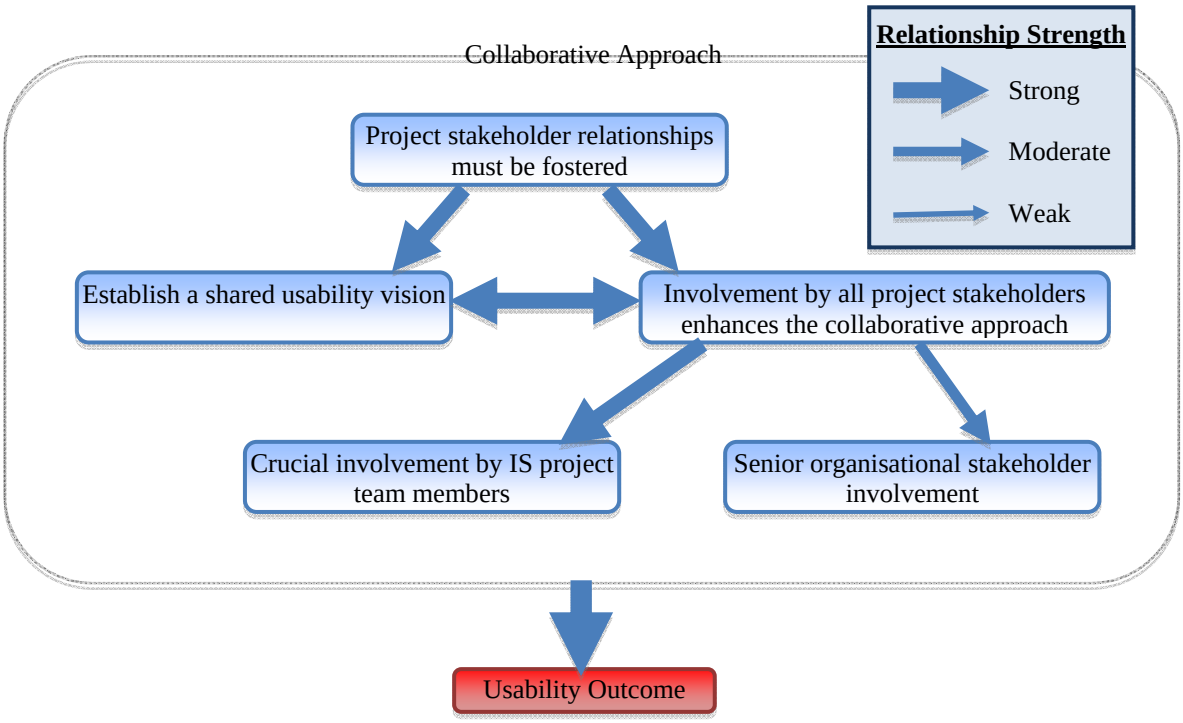

Figure 5-9: Collaborative Approach concepts impact on usability outcome

The relationships between concepts shown in Figure 5-9, provides a guide to the concepts that need a greater initial focus in a project, before a significant impact on the usability outcome occurs. Simply fostering relationships does not have a significant impact on increasing project stakeholder collaboration, but once relationships have been fostered, creating a shared vision with and involving project stakeholders can lead to improvement in the usability outcome for an IS project. Two strong relationships exist between concepts grouped within this theme. The following two sections will describe these relationships more deeply.

Fostering project stakeholder relationships to maintain involvement

Fostering project stakeholder relationships is important in maintaining involvement in usability activities. This relationship has a very strong relationship concept within the Collaborative Approach theme. This relationship concept is made up of two strong relationships across the five concepts in this theme.

The first strong relationship concept is based on a relationship between the concepts ‘Project stakeholder relationships must be fostered’ and ‘Involvement by all project stakeholders enhances the collaborative approach’. The essence of this relationship is the need for fostering of relationships to maintaining involvement by project stakeholders, in the usability activities, throughout the project lifecycle. Relationships need to be fostered right through the stakeholder population for the project, usability practitioners need to go across boundaries within an organisation and need to foster relationship across the organisational hierarchy. Fostering of relationships helps engage and involve a variety of stakeholders includingsubject matter experts, technological experts and project sponsors (managers), see Section 5.2.8 for discussion on project stakeholders. Fostering relationships in a project to gain involvement can be difficult. Access to stakeholders may be blocked or resisted by the stakeholder or their manager(s). The wrong stakeholders may be engaged. The stakeholders may have been neglected previously, because of lack of usability consideration in the past.

The second strong relationship is between ‘Involvement by all project stakeholders enhances the collaborative approach’ and ‘Crucial involvement by IS project team members’. The essence of this relationship is to involve the IS project team members in usability activities as a key part of the project lifecycle. Mainly involved through observation of usability activities, they sometimes need restraining because they want to rectify the problematic usability issues during observations. The key benefit for IS project team members, gained through involvement, is improved usability understanding by making the nature of usability issues real. Continued involvement throughout the project, can improve project decision-making, with consideration for the project’s shared usability vision. The involvement by IS project team members was predominantly discussed by usability practitioners with a management role (see Section 5.3.2 for further analysis). The IS project team members are a key stakeholder to bring on board with the

concept of usability.Grooming them as long term usability champions will improve collaborative approach to performing usability.

Fostering project stakeholder relationships is a key role played by usability practitioners. This relationship is important for all project stakeholders, but especially the members of the IS project team. Since, they are the ones who will be implementing theISand that will incorporate the usability mindset for the project. Therefore their involvement must be maintained through a project's lifecycle, to helps nurture the shared usability mindset and enhances usability understanding for the project.

Fostering project stakeholder relationships to establish a project usability vision

Fostering project stakeholder relationships is an important way of establishing a project usability vision. This relationship has a very strong relationship concept within the Collaborative Approach theme. This relationship concept is made up of two strong relationships across the five concepts in this theme.

The first strong relationship concept is based on a relationship between concepts 'Project stakeholder relationships must be fostered' and 'Establish a shared usability vision'. The essence of this relationship is that the fostering of project stakeholder relationships provides a collaborative environment that enables a shared usability vision to be developed and adhered to. This includes all stakeholders across the project. The relationships enable the expertise of the various stakeholders to be exposed to the project which enhances the definition of usability for the project and hence the shared usability vision. To be able to improve the shared usability vision in a project, a usability practitioner must be present within it to have the conversations with project stakeholders, speaking appropriate language to enable better communication with stakeholders, and provide constant feedback on usability activity findings.

The second strong relationship is between the concepts 'Involvement by all project stakeholders enhances the collaborative approach' and 'Establish a shared usability vision'. The essence of this relationship is that involvement makes the usability real to project stakeholders, which

builds the shared usability vision and the usability value for the project. Having the various stakeholders involved, provides other expertise to the engagement. This enables domain experts, technology experts and other organisational knowledge to be included to create and shape the shared usability vision for the project. Mentoring project stakeholders is a close involvement that enables the usability journey to be shared and a common usability vision to develop. Usability education of the stakeholders involved also helps develop the shared usability vision.

It's only through this involvement that all aspects of the project can be explored with the project stakeholders to enable a truly shared usability vision for the project (i.e. usability mindset). This involvement enables usability goals and project constraints to be elicited, articulated and incorporated into the usability mindset.

The major difference between these two very strong internal relationships is that one focuses on the collaboration required for establishing a shared vision among all stakeholders, while the other relationship focuses on fostering relationships and maintaining involvement of project stakeholders in usability activities throughout a project. Both are key relationship concepts that can improve collaboration in a project and hence improve the usability outcome.

5.1.7. Project Constraints

Project constraints are an important consideration when a collaborative approach is used to develop a usability mindset. This predominantly involves consideration of organisational constraints that are external to project, often elicited from different stakeholders (discussed in Section 5.2.8) across the organisation through involvement activities. The time and budgetary limits specified in project plans, the inevitable project overruns and tightening of time and budgets have significant impact as a project constraint. The compliance to the project lifecycle process may mean inflexibility when performing usability activities and the inability to react to the usability findings. The timing of when usability is initiated in a project lifecycle may also further limit what can be done from a usability perspective. The technological constraints, often unknown without IS project team member involvement, can also have significant impact on the usability recommendations generated. The involvement of project stakeholders, including usability practitioners, can lead to the elicitation, understanding and mitigation of project constraints.

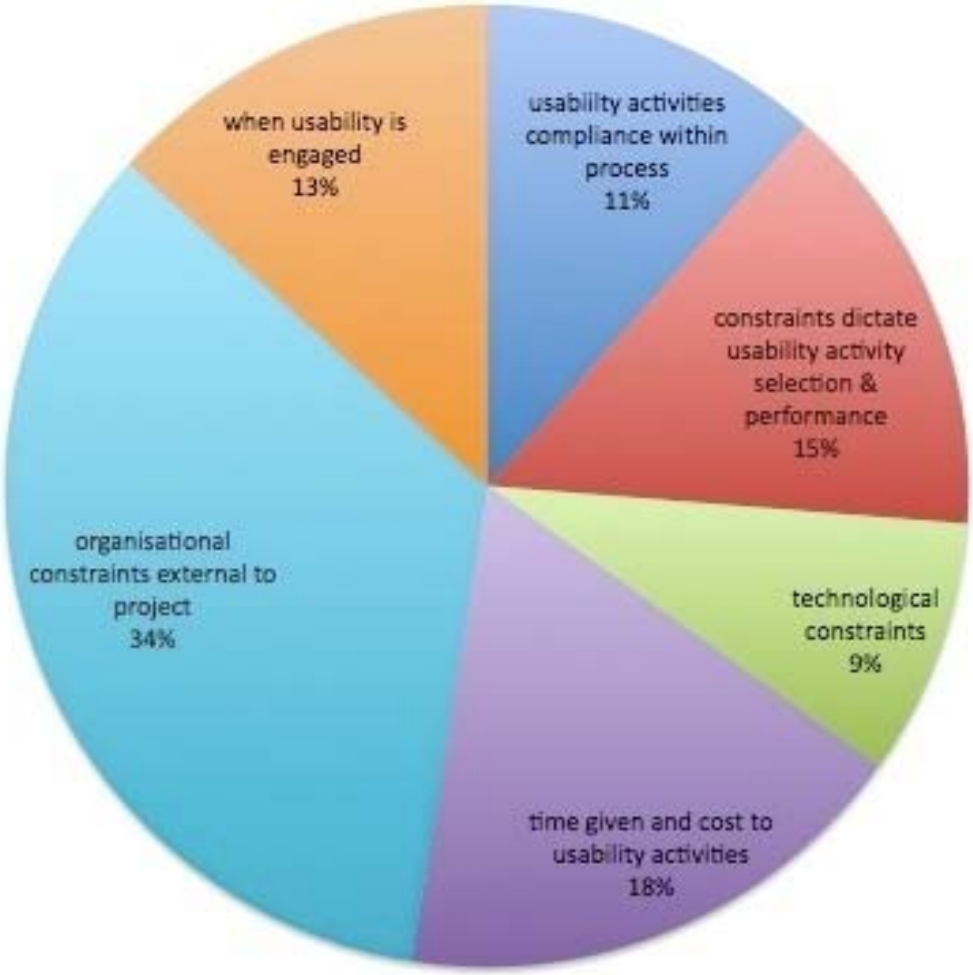

Figure 5-10: Project constraint themes set of concepts, showing percentage of coded references

The lesson learnt from this theme is that due consideration and identification needs to be made of project constraints. These project constraints may conflict or compete with the articulated set of usability goals that define the usability mindset for a project. These usability goals and project constraints may conflict or compete, requiring concordance by usability practitioners, best done with involvement by project stakeholders.

The strongest concept (shown in Figure 5-10), 'Organisational constraints external to project', discusses the tension generated between various parts of an organisation on a project. This could be construed as a weakness in the concept, but it is a collection of external project forces, like legal or marketing issues, that create tension among other project constraints and usability mindset concepts. The 'Allocating resources to usability activities' concept is a strong contributor to this theme discussed by many of the usability practitioners interviewed. Both of these concepts factor heavily in the significant relationships discussed later, in Section 5.2. The

following section will discuss the concepts and relationships between concepts for the project constraint theme.

5.1.8. Project constraint concept group relationships

There are six concepts within the project constraints theme that means a possible fifteen relationships between the concepts. Of these relationships one is a strong relationship, three moderate relationship and nine weak relationships. This concept grouping is a well-related set that demonstrates a highly cohesive theme. These relationships are derived from the cross interaction between concepts found in the primary data, see Appendix D-G.

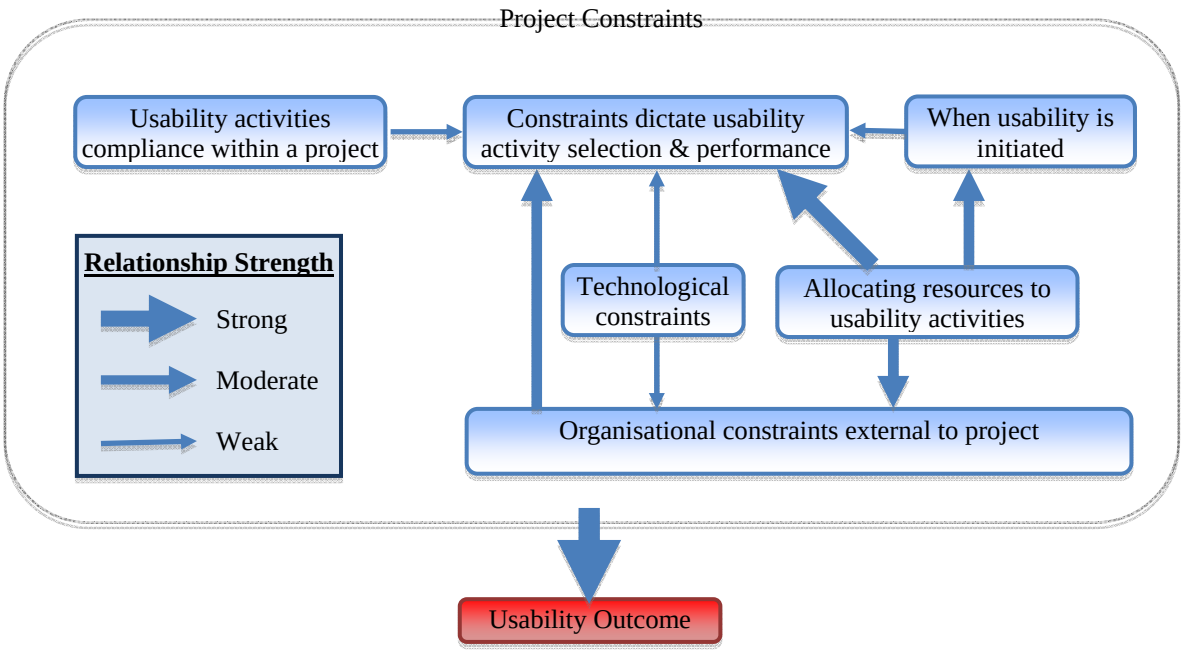

Figure 5-11: Project constraint concepts impact on usability outcome

Usability practitioners, as part of their role, consider the 'Constraints dictate usability activity selection & performance' and 'Usability activities compliance within a project lifecycle' as important project constraints. These two concepts require consideration of project constraints in order to select, perform and comply in the performance of usability activities in a project. The other concepts are all key project constraints that have been discussed by usability practitioners as significant. All of these concepts individually can have an impact on the overall project

usability outcome, but combinations of these constraints can amplify the limitations that impact on the project usability outcome.

The figure (Figure 5-11) provides a guide to the interaction between the concepts grouping in the project constraint theme. It shows the stronger relationships with thicker arrows. This demonstrates a moderate relationship between the ‘Allocating resources to usability activities’ concept and ‘Organisational constraints external to project’, which gives rise to the importance of considering time and cost when looking to concord conflicting project elements. The importance of ‘Allocating resources to usability activities’ is further demonstrated with a strong relationship with ‘Constraints dictate usability activity selection & performance’ concept, which has been discussed further in the next section.

Project constraints impact on the selection and performance of usability activities

This strong relationship concept is based on a relationship between the concepts ‘Allocating resources to usability activities’ and ‘Constraints dictate usability activity selection & performance’. The essence of this relationship is that selection of usability activities to perform in a project is often dependent on the project constraints. The predominant constraints affect the selection and performing usability activities are the time given and budget (cost) available. Performing other project activities in parallel with the usability activities to save time is not desirable from a usability perspective, and may actually increase project costs. Often the project activities will be impacted on by the results of the usability activities. These usability findings may even require further investigation or evaluation, hence the need to perform additional usability activities. Engaging usability practitioners late in a project lifecycle, often means limited time, inflexible usability scope, and often the set of usability activities in project plan are prescriptive.Often these usability practitioners are usability consultants that suffer from this problem and other issues (see Section 5.3.3 for discussion). The iterative nature of performing usability activities and acting on the usability findings from these activities, may require a further iteration of usability activity performance, which is often not possible because of the project time and cost constraint.

5.2. Inter theme relationships

The following inter-theme relationships are not specifically related to the whole theme, but are between one or more concepts within the theme relating to one or more concepts within another theme. The twenty-seven concepts that have emerged from this research have each been compared. There were varying levels of strength in the relationships based on the number of usability practitioners and the number of coded references who discussed the two concepts within the same contributions in the interview data. The following relationship concepts have emerged from one or more concept comparisons. These significant relationships are part of the selective coding process, as discussed in the methodology chapter (Section 3.6). The six significant relationships presented here are standouts in the concept comparison.

This sub-section will discuss each of the significant relationships, describing the essence of each relationship. These relationship concepts can consist of one or more sets of strong intersecting concepts. These strong relationship concepts have concepts that are from two different themes, while the strong internal relationship concepts have been discussed earlier during the individual theme discussion. The intersecting concepts have been grouped based on similar analysis results from the examination of the coded references. Each relationship concept has been adorned with a small graphic that represents the research framework. This highlights (in red) the relationship concept being discussed in section, providing its context within the research framework. At the end of this section, an analysis of the strength of the relationships between themes is discussed.

5.2.1. Usability mindset prevails beyond the project context

Establishing a usability mindset in project stakeholders improves their usability maturity and creates usability champions, which enables the best usability decisions in current project and future project engagements. Stakeholders with a usability mindset can have a significant impact on the usability maturity of other project stakeholders and the organisation's usability maturity. This relationship concept is made up of two strong relationships across the twenty-seven concepts.

The first strong relationship is between ‘Nurture usability understanding’ and ‘Involvement by all project stakeholders enhances the collaborative approach’ concepts. The essence of this relationship is to effectively nurture usability understanding through involvement by all project stakeholders. Project stakeholders need to gain an appreciation of the philosophy behind usability and the various activities performed to generate usability findings. This nurturing of usability understanding does not only help improve usability outcomes for the current project, but it provides stakeholders a usability mindset for future projects, and is the basis for improving the organisation’s usability maturity.

The second strong relationship is between Making usability real to create a shared vision for project stakeholders’ and ‘Establish a shared usability vision’ concepts. The essence of this relationship is to facilitating involvement in usability activities, usability education and usability mentoring of project stakeholder. This will, firstly, provide the opportunity to make usability real to stakeholders; secondly, establish a shared usability vision for the project; ultimately, a usability mindset will be cultivated with key project stakeholders that will begin improving the organisation’s usability maturity.

This relationship concept describes a phenomenon whereby the involvement of project stakeholders can be such that the usability mindset extends outside the performance of a specific usability activity and outside project boundaries. It is more than just making usability issues real or creating a shared usability vision among the project stakeholders. The creation of a usability mindset allows a stakeholder to go beyond simple acceptance of usability to embrace the usability perspective with a usability mindset that allows appropriate usability decisions to be made throughout a project and within an organisation.

5.2.2. Shared usability vision by all project stakeholders

Involving all project stakeholders is an important way of gaining acceptance of the value of usability. The usability understanding gained through involvement can grow beyond recognising the value of usability. It engages stakeholders and creates a shared understanding of this usability value that

goes across the project. This higher-level usability understanding becomes a shared usability vision for the project, by project stakeholders, which is a key part of improving the usability outcomes of a project. This relationship concept comprises two strong relationships across the twenty-seven concepts.

The first strong relationship is between the concepts ‘Making usability real to create a shared vision for project stakeholders’ and ‘Involvement by all project stakeholders enhances the collaborative approach’. The essence of this relationship is that project stakeholder involvement in usability activities allows experiencing and observing the usability issues. This starts with the primary stakeholders, users, being involved in usability activities, such as design evaluations. Project team members, such as developers, may observe usability issues through involvement in usability activities, to make usability issues real to them. The organisational stakeholders need to be kept involved through constant communication and presentation of usability findings. Usability documents can be used to provide a memory of the involvement and make it real to those unable to physically be involved and those that are engaged later in the project lifecycle. Involvement is a two way street, because the usability practitioner benefits from the stakeholder understanding of the problem domain and/or technological constraints of project environment. It creates an exchange of expertise.

The second strong relationship is between ‘Usability activities involvement enhances usability mindset’ and ‘Involvement by all project stakeholders enhances the collaborative approach’. The essence of this relationship is that involvement in usability activities allows the usability to become real and leads to improved usability understanding that enhances the usability vision for the project. The usability findings of usability activities are presenting back to improve the value of usability. Initial involvement provides acceptance of usability value, which develops into a shared usability vision for the project.

This concept relationship describes the importance of involvement to move beyond usability value by making usability real to create a shared usability vision. This usability mindset, is limited to the project, but provides usability understanding to enable better usability decisions within the project. This concept describes something that is beyond simple usability acceptance, it’s beyond just understanding its value to enable usability activity performance in a project. Here, project stakeholders need to be usability educated to embrace the projects usability mindset, predominantly through involvement in usability activities.

5.2.3. Project constraints discovered and concorded through involvement

This strong relationship concept is based on a relationship between the concepts ‘Organisational constraints external to project’ and ‘Involvement by all project stakeholders enhances the collaborative approach’. The essence of this relationship is that identifying the organisational constraints is made easier when involvement of project stakeholders is established from the start of the project. The organisational constraints are made up of, for example, organisational politics, government structures and legal issues. These constraints along with the time given & cost, project stakeholder goals and technological constraints, may not all work well together certain tensions between them may exist.This is where, with project stakeholder involvement, these tensions or conflicts can be concorded and/or prioritised so that they can be enfolded into the usability mindset of the project. Without engaging the right project stakeholders, the identification and understanding of the various other constraints (other than time and budgetary project constraints) may not occur, and if it does it may be late in the project lifecycle. Involving project stakeholders can help identify various organisational constraints, also aid in the understanding and interpreting domain specific constraints.

5.2.4. Project constraints impact on usability goals

This strong relationship concept is based on a relationship between concepts ‘Usability goals promote a usability mindset’ and ‘Organisational constraints external to project’. The essence of this relationship is that conflicting usability goals provide an opportunity to involve stakeholders in concording, balancing and/or prioritising these usability goals with consideration for the organisational constraints. The concordance of the usability goals provides the building blocks

for usability mindset of the project. The most common conflict is often between the primary user goals and business goals. Other usability goals discussed included legal issues, upselling goals, and organisational politics. The upselling goal is an interesting example of organisational constraints that highlights the broader organisational goals that may impact on project goals. These and other project constraints can impact on the usability goals and through involvement can be discovered and considered enfolding into the project usability mindset.

5.2.5. Articulating and concording usability goals is core to project usability mindset

This strong relationship concept is based on a relationship between concepts 'Measuring usability goals' and 'Usability goals promote a usability mindset'. The essence of this relationship is that at the start of a project, during the research/analysis phase, the top four to six usability goals are articulated, defining the usability mindset for project. These goals may need to be concorded, based on conflicting goals, between project goals and/or project stakeholder's goals. The resulting set of usability goals needs to be operationalised in the project. They need to be measured during the project lifecycle, to provide evidence and indicators on how well and to what degree the usability goals have been met for the project. They become the basis for the usability vision throughout the project lifecycle, driving the performance of usability activities and interpreting of the usability findings. The documentation of these usability goals and the usability measures provides a memory for the project lifecycle that can be referred to by project stakeholders.

5.2.6. Managing stakeholder involvement in usability activities

This strong relationship concept is based on a relationship between concepts 'Managing stakeholder involvement' and 'Involvement by all project stakeholders enhances the collaborative approach'. The essence of this relationship is that a major task performed by usability practitioners is managing the stakeholder involvement with usability activities. This involvement can be anytime through the project lifecycle. The involvement can be from a variety of project stakeholders. It is important to get representative from the various stakeholder groups in a project, such as management, developers, other IS project members, and primary users. The type of involvement may vary from active participation to observation of usability activities. Management of stakeholder involvement requires identifying the right stakeholders, enabling them to be released from their normal work and making the best use of the time that they have given to the participation. The usability practice of managing involvement, with the requirement of collaborative approach of involving all project stakeholders throughout a project lifecycle, means this relationship is also highlighting that involvement is not a cost-free activity. Indeed it can be quite costly.

5.2.7. Relationship linkage analysis

This section (5.2) has presented six major relationship concepts that link the four major themes. These relationship concepts describe important aspects to be considered by usability practitioners in performing their usability activities. In Figure 5-12, it shows the major themes in circular objects and strong inter-theme relationships as two-way arrows. The thicker arrows describe relationships that incorporate multiple strong relationships between the themes. The section number for each theme, strong internal relationships and inter-theme relationship has been shown in this figure. Each of the themes has many internal relationships between the concepts grouping within it. These have been discussed in detail during the theme discussion, in Section 5.1.

The key consideration that this section will present is the relationship between the collaborative approach theme and usability mindset themes. Figure 5-12 and Figure 5-13 both show two strong relationship concepts between these themes. This is made up of five concepts, two from the collaborative approach theme and three from the usability mindset theme. This highlights a very close relationship between these two themes.

Figure 5-12: Themes highlighting significant concept relationships

There are two strong internal relationship concepts in both of these key themes (discussed in Section 5.1.2 and 5.1.6). When analysing the data within these internal relationship concepts, an interesting correlation can be drawn. Each of the internal relationship concepts in each theme links very strongly to an internal relationship concept in the other theme. A strong correlation exists between the number of practitioners that discussed the set of concepts for one internal relationship concept (discussed in Section 5.1.2) and the set of concepts (discussed in Section 5.1.6) for the other internal relationship concept.

The first correlation is between the internal relationship concept‘Fostering project stakeholder relationships to maintain involvement’ and ‘Usability Activity involvement makes it real and nurtures usability understanding’. There is a strong correlation with all six concepts involved, three from each theme, shown in Figure 5-13 as the first set of red arrows. The essence of this relationship highlights the importance of fostering project stakeholder’s relationships to strive for involvement in usability activities as a way of making it real and promoting usability understanding.

The second correlation is between the internal relationship concepts ‘Fostering project stakeholder relationships to establish a project usability vision’ and ‘

Making usability goals real in project improves usability mindset’. There is a strong correlation with all five concepts involved, three from collaboration approach theme and others from usability mindset theme, also shown in Figure 5-13 as the second set of red arrows. The essence of this relationship focuses on fostering of project stakeholder relationships to establish a shared vision, through establishment of usability goals by making it real and thereby establishing a usability mindset.

The correlation of the link between these internal relationship concepts, as shown in Figure 5-13, further reinforces the very strong bond between the two themes. The essence of this very strong union means that it’s not enough to involve project stakeholders in usability activities to generate great usability findings. It’s not enough to nurture usability understanding to create a usability mindset for project stakeholders. The combination of collaboration to develop and enforce a usability mindset for project stakeholders and a usability mindset is developed and enforced using collaborative usability activities, create a hierarchy of engagement for usability understanding. These two themes go hand-in-hand when looking to achieve an improved usability outcome for a project.

Figure 5-13: Strong internal relationships are linked across themes.

This union between the Collaborative Approach theme and Usability Mindset theme, in relation to the strong concept relationships, has highlighted a hierarchy of usability mindset and collaborative approach (HUMCA) within it. This includes:

- Level 0 – Advocacy – usability concept is not known or understood by project stakeholders, it may be performed because it's part of the project process. It may also be performed because usability has been sold to them as important to do.
- Level 1 – Usability value – stakeholder look to involve usability because they understand the value to the project. This usability value maybe evangelised to the project stakeholders to improve understanding. Provides usability acceptance with project stakeholders of usability findings and recommendations. Often is done through presentations and reports.
- Level 2 – Shared usability vision – the creation of a shared usability vision for the project, shared by all project stakeholders. This project level usability mindset must evolve from having no usability mindset or having an understanding of its value. It allows for consideration of usability mindset during project lifecycle and for project

decision-making. This shared vision is best created by having all stakeholder observe usability activities.

- Level 3 – Integrated usability mindset – usability education and mentoring, through active participation, provides stakeholders the usability knowledge to apply usability concepts beyond the current project. Usability becomes part of the project and organisational mindset leading to unconsciously being considered during project conceptualisation through to post implementation phases.

This hierarchy highlights a collaborative approach in generating various levels of usability understanding with project stakeholders to better serve a more beneficial usability outcome for the project. This hierarchy is an engagement induced development of the usability mindset. Collaboration on its own can improve the usability outcome. Improving the usability understanding of project stakeholders can also help improve the usability outcome. But, considered together they provide a more potent potion to reach an even better usability outcome for a project and ultimately improve usability maturity. This intersection of elements of these two themes and hierarchy are expressed in a grid, see Table 5-4.

Stakeholder engagement refers to all project stakeholders groups (Section 4.2), as discussed in the Collaborative Approach theme (Sections 4.4 and 5.1.5). If a stakeholder group is not represented within the project this limits the level of HUMCA hierarchy attainable.

Collaborative Approach Levels	HUMCA
Participation	Level 3
Observation	Level 2
Presentation or report	Level 1
User advocacy	Level 0

Usability Mindset Levels	HUMCA
Organisational mindset	Level 3
Project Shared Vision	Level 2
Usability Value	Level 1
No usability understanding	Level 0

Table 5-4: Collaborative approach theme and Usability mindset theme compared to HUMCA hierarchy.

When comparing the various elements of the two themes (Table 5-4) of the HUMCA hierarchy you can postulate a specific level being achieved either to a low, moderate or high level. An unknown level of usability understanding can have some incidental understanding or low understanding achieved. The usability value of usability understanding can be attained at a very

low level 1 of HUMCA hierarchy with user advocacy, but with more involved engagement a higher level 1 can be attained. Reaching a shared usability vision or improving of the usability mindset for a project is not possible with all project stakeholders if user advocacy is employed.

When participation or observation is employed within a project, if a stakeholder group (Section 4.2) is not engaged, this lowers the level of HUMCA hierarchy attained, e.g. Participation or observation at a project level provides a high level 2 in HUMCA hierarchy with all project stakeholder groups participating. This is moderate or low if some groups are not engaged. This is also limited if only engaged through dissemination of usability mindset using documentation or presentation techniques.

The HUMCA hierarchy provides an important consideration to achieving a better usability outcome for a given project and improvement of usability maturity across an organisation. The relationship between the two themes, involved in this hierarchy, is a two-way relationship. Collaborative approach can help shape a usability mindset for a given project, improve general usability mindset beyond a project and improve usability findings generated. The usability mindset guides usability practice across the project stakeholder groups, improving usability outcomes and provides a concorded set of usability goals that focuses project stakeholders.

5.2.8. Summary

The discussion in this section of the analysis has highlighted one very important aspect of the derived framework that looks to provide an answer to the research question. The analysis introduces various themes that have an impact on the usability outcome of a project that form part of the framework developed. Each of the themes has a key perspective that is brought to bear on the project usability outcomes. The consideration for project constraints and an appropriate usability practice are important parts to this framework. But a key aspect to the framework is that there is a very strong relationship between the collaborative approach and usability mindset themes. The strength of this relationship is so strong that it can be described asa symbiotic relationship. The relationship with the other two themes is not as strong, but still significant enough to have an impact on the usability outcome of a project. The strong relationship does highlight a hierarchy of usability mindset and collaborative approach (HUMCA) that looks to stakeholder engagement and development of usability understanding to improve usability outcomes.

5.3. Demographical relationships

The twenty-seven concepts were also compared to various demographics data, of the interviewed usability practitioner. See Section 4.1 for a summary of demographic attributes of interviewed usability practitioners. This section is focused on examining significant differences with gender, usability practitioner role (usability manager or practitioner), usability practitioner type (usability consultant or organisational) and number of years of experience.

5.3.1. Gender

The set of research interviews involved twenty-one usability practitioners, of which thirteen are male and eight females. There were no significant (i.e. moderate to very strong relationships) differences between the practitioners based on gender that would impact on the usability outcome of a project. It was examined, but did not add value to the theory generated by this research.

5.3.2. Usability Management vs Usability Practitioner

When examining the interview data, each usability practitioner was coded as either a usability manager or a usability practitioner. The usability managers were those who headed a team of usability practitioners, and whose role included managing and allocating usability resources to projects. The managers also, if in a consultancy company, may be looking for the next usability engagement, which requires usability selling. This research encountered twelve usability practitioners whose role included that of a usability manager.

The usability practitioners were those who did not have usability manager responsibilities, and were focused on the performance of usability activities in projects, either as a usability consultant or an organisationally based usability practitioner. This research interviewed nine usability practitioners.

Concepts	Manager	Practitioner
Crucial involvement by IS project team members	100%	55.6%
Skillset and experience of usability practitioner	75%	44.4%

Table 5-5: Usability Manager vs Usability Practitioner, percentage of interviewees that discussed concept

There are two concepts that had significant (more than 30% coded references) difference in the number of usability managers and usability practitioners that have discussed the concepts,as shown in Table 5-5. Both usability managers and usability practitioner discussed the importance of involving the IS project team members in the concept 'Crucial involvement by IS project team members'. All twelve usability managers discussed the importance of having the IS project team involved and understanding the usability value. It was predominantly discussed in the typical day (four usability managers), good story (six usability managers and three usability practitioner) and bad story (five usability managers and one usability practitioner) during the interviews. In the typical day discussion, all four usability managers, discussed communication with and involvement of, IS project team members as important.

In the bad stories, the IS members' involvement was low, usability ownership was questioned, vendors were part of the project and resisted involvement, understanding of the usability value was low and technological constraints were not understood. This was identified and discussed predominantly by the usability managers. In the good stories, IS project team members were involved, through observation of usability activities, or sharing the usability journey with usability practitioners, or being skilled up as usability practitioners by mentoring to be groomed as usability champions for project. Both usability managers and practitioners discussed this. This concept has an impact on one of the internal relationship concepts, i.e. 'Fostering project stakeholder relationships to maintain involvement', in the collaborative approach theme. Usability practitioners consider this internal relationship more important than usability managers when it comes to improving the usability outcome.

The concept 'Skillset and experience of usability practitioner' describes the skills and experience required to achieve good usability activity outcomes. The usability managers, with their role of allocating usability resources, saw this as a crucial consideration when resourcing usability for a project. Being able to provide usability practitioners with appropriate skills and experience to provide usability value to a project given the project constraints. This concept was part of an internal relationship in the usability practice theme, which related to the concept about working in usability teams. The usability manager's focus on these two concepts is clearly

important.Skills, experience and working in teams are key determinants used to help allocated usability resources to projects.

In summary, the usability managers see the importance of usability practitioners having a good skillset and experience base when engaged to perform usability in a project. Where needed, usability mentoring is a great way to improve usability practitioner skills. Usability managers are also more aware of problems with involvement, especially the need to get involvement from the IS project team members, to bring the technological issues (constraints) into consideration.

5.3.3. Usability consultant vs. organisational based practitioners

The comparison of usability consultants (eight practitioners) and organisational-based practitioners (seven practitioners), presents an interesting set of differences that may impact the usability outcome. There are six usability practitioners that had been in both roles, which for purposes of highlighting the concepts that have a significant difference (more than 30% of practitioners) have been ignored in this initial analysis.

Concepts	Consultant	Organisational
Usability activities compliance within a project lifecycle	75%	42.9%
Constraints dictate usability activity selection & performance	100%	57.1%
Technological constraints	50%	14.3%
Allocating resources to usability activities	100%	57.1%
Nurture usability understanding	62.5%	100%
Usability education of project stakeholders	37.5%	85.7%
Maintain flexibility with usability practice	75%	42.9%
Validation of usability practice	50%	0%

Table 5-6: Usability consultants and organisational usability practitioners, percentage of interviewees that discussed a concept

Organisational-based usability practitioners did not discuss working within the organisation process as being problematic, because they are working within the same organisation structure and have a clear understanding of what is possible. The selection and performance of usability activities, and being flexible with performance of usability was not a highly discussed concept. The technological constraints are less of an issue, because working within the organisation they can have conversations and discussion to gain an understanding of what is possible with the

appropriate IS project team stakeholders. The time and budget for a project can be discussed at the inception of a project when involved from the start where within an organisation is more likely. The nurturing of usability understanding and performing usability education can be done, when involved in the organisation because the usability practitioner is available from day-to-day to have conversations with the various project stakeholders. Working within an organisation provides an opportunity to take the usability mindset beyond the project to the organisation's culture, to improve the usability maturity. Validation of usability findings by external usability consultants and limitations encountered by usability consultants were not discussed.

The usability consultants find themselves engaged into the project lifecycle at the specific points where their expertise is needed, which assumes a high level of usability maturity in the organisation and the project stakeholders. Project constraints have a huge bearing on what can be selected and performed as usability activities for project. Technological constraints have a larger impact due to the time and access needed to foster relationships with IS project team members. The time given and budget allocated also provide limitations on what can be done because often they are not engaged at the start of a project to have an impact on the project plan. The usability education of stakeholders is limited by their short-term engagements. The generation of usability documents is the main deliverable for their engagements, they are not judged on the overall usability outcome for a project. Due to the project constraints they find it difficult to be flexible with the performance of usability activities so they can maximise the usability findings generated. Often usability consultants will be asked to validate usability findings generated by internal organisation usability practitioners. They are more likely to encounter limitations that are out of their realm of control, in relation to the access to stakeholders (involvement), organisations usability maturity and organisational constraints (e.g. legal issues or politics).

This discussion shows that these concepts can vary significantly in relation to the performance of usability activities by a usability consultant or an organisationally based practitioner. The main differences include the following topics:

- Level of access to project stakeholders
- Time when usability is initiated in a project
- Involvement in project plan at start of project
- Opportunity to change the usability mindset for project or organisation (beyond usability activities and beyond project)

- Traction with mitigating project constraints
- Selection and performance of usability activities

The above list of differences, between consultants and organisational-based usability practitioners have an impact on one significant relationship concept, discussed in Section 5.2.1. The ‘Nurture usability understanding’ concept was discussed predominantly by the organisational-based usability practitioner, who find themselves working day-to-day with the various project stakeholders and can have ongoing conversations with them. The usability consultant is often engaged for a particular part of the project, which limits their engagement to a snippet of the project lifecycle, which reduces the possible impact they can have to nurture usability understanding.

There were other internal relationship concepts (within themes) that are also impacted by this sections analysis. The first is the internal relationship concept is ‘Project constraints impact on the selection and performance of usability activities’. This is impacted on by two concepts discussed in this section. The essence is that usability consultants emphasised the selection and performance of usability being impacted on the project constraints, whereas for organisational-based usability practitioners it was not a significant issue. This difference may be the result of organisational usability practitioners having established better communication with project stakeholders, established usability credibility and understanding of organisational development process. On the other hand, usability consultants engaged in a project need to establish and fostering communication, credibility and understanding of organisational processes for each engagement, with the project stakeholders. This was discussed by all the usability consultants interviewed as being important and significant to a projects usability outcome.

The second is the internal relationship concept is ‘Usability Activity involvement makes it real and nurtures usability understanding’. This relationship is similar to the significant relationship discussed earlier. The essence here is that the involvement required to nurture usability understanding can be harder to obtain as a usability consultant. This is because usability consultants have a limited engagement that does not allow for project stakeholder involvement in usability activities. On the other hand, all the organisational-based usability practitioners discussed and described the importance of project stakeholder involvement as an important way to contribute to the nurturing of usability understanding.

There are other differences between these two types of usability practitioners. This section has presented the key differences that have a significant impact on internal and external relationship

concepts defined in this research. These have been presented to provide emphasis on the perspective that has predominantly made a relationship significant. For example, 100% of the usability consultants found the time and cost constraint concept along with the constraints dictating the selection and performance of usability as important concepts for consideration when engaged in a project to perform usability, where just over 50% of organisationally-based usability practitioners said this. On the other hand, 100% of organisational-based usability practitioners discussed the opportunities to help nurture usability understanding to project stakeholders, where just 60% of usability consultants discussed this as important. The type of engagement a usability practitioner has with the project, as a consultant or an organisational-based practitioner, does present various constraints and relationship limitations in the performance of usability activities.

This section would suggest, based on the discussions, that organisational-based usability practitioners have a better opportunity to have a beneficial impact the project's usability outcome. Usability consultants are reliant on the usability maturity of the organisation. Without it their impact on the project's usability outcome can be significantly stifled by the various concepts discussed in this section.

The usability practitioners (mixed) that had been both organisational-based and consultant practitioners discussed most of the concepts discussed by both organisational-based and usability consultants. There was no value in looking at differences between mixed and organisation-based or mixed and usability consultants. It does not provide any significant differences. Mixed usability practitioners highlighted concepts discussed in the guidelines for practice section (see Section5.5).

5.3.4. Usability practitioner experience level

When examining differences in the experience level of usability practitioners, two concepts had a significant (more than 30%) difference, see Table 5-7. The 'High' usability practitioners (thirteen practitioners) were ones that have ten or more years as usability practitioners, whereas the 'Low' usability practitioners (eight practitioners) have between five and nine years experience as shown in Table 4-8.

Concepts	High Experience	Low Experience
Evangelising usability to project stakeholders	50%	84.6%
Validation of usability practice	12.5%	46.2%

Table 5-7: Usability experience level, percentage of usability practitioners that discussed concept

The only differences found in this comparison are concepts found in the usability practice theme. Those usability practitioners with a lower level of experience discussed evangelising and selling usability to organisations and project stakeholders as being important. They were in the majority when it came to encountering the need to have external usability consultants to validate usability.

The experienced (high) usability practitioners found less need to evangelise or sell usability to the organisation or project stakeholders. They must have had enough credibility with project stakeholders that their usability findings were accepted and did not require external usability consultants validating the findings.

5.4. Interview questions

The interview questions, discussed in Section 3.8, compared with the four major themes, see Table 5-8, highlight a number of significant relationships. The typical day question generated a lot of 'Usability Practice' coded references. This highlights many practices performed by usability practitioners as part of their role. The nature of the question would suggest discussion about these sorts of activities performed on a day-to-day basis.

The majority of the 'Project Constraints' coded references were found in the bad story question as opposed to the good story. This makes sense, since stories that had a bad usability outcome would often have elements that had constrained the performance of usability activities. Often usability findings cannot be acted upon in the project because of the project constraints.

The background question did not yield many coded references for the major themes. It was mainly a discussion of academic qualification and work experience, with the occasional mentoring roles played within project engagements or organisational positions. This question was used to code usability practitioner's attributes that are used for analysis in this chapter.

The additional four questions were not asked at all the interview sessions, and therefore have a lower source and coded reference count. The most significant relationships were for the usability goal conflict question relating to the 'Project Constraints' and 'Usability Mindset' theme. This

highlights a significant relationship that is discussed later, in Section 5.2.4. The usability mindset was further discussed in the question about evangelism, but mainly in relation to gaining acceptance of usability or improving stakeholder's perception of the value of usability. The organisational vs consultant question was predominantly discussed in the 'Usability Practice' theme. The coded references focused on the difference applying the usability activities in the two roles. Section 5.3.3 examines the differences between organisational practitioners and consultants in more detail.

The questions on a good story and bad story produced many coded references for the themes 'Collaborative Approach' and 'Usability Mindset' and both have a significantly high number of sources and coded references. The 'Project Constraints' theme lacked sources and coded references in the good story question, while 'Usability Practice' theme lacked sources and coded references in the bad story. This suggests significant relationships have been derived for these two themes. This relationship provides the basis for the two strongest significant relationships, in Section 5.2.1 and 5.2.2. This also highlights the strong relationship between these two themes discussed in Section 5.2.7.

Interview Question	Collaborative Approach	Project Constraints	Usability Mindset	Usability Practice
Background	2 (5)	1 (1)	3 (7)	5 (7)
Typical day	14 (34)	14 (39)	14 (47)	18 (70)
Good Story	17 (66)	12 (26)	17 (65)	17 (56)
Bad Story	17 (52)	18 (64)	16 (68)	14 (34)
Other Discussion	13 (32)	13 (32)	14 (57)	16 (53)

Table 5-8: Number of sources and coded references for each theme per main interview question

In summary, the majority of the sources and coded references were for three of the major themes (Usability Mindset, Collaborative Approach, and Project Constraints) that were discussed during the good and bad story questions. The typical day predominantly discussed the usability practice theme. This analysis of the interview questions against the themes, provides further evidence on the symbiotic relationship between the collaborative approach theme and usability mindset theme. The major questions on which the concepts and themes of the framework are based are predominantly on the good story and bad story questions. This was the expected source of data for this research.

5.5. Guidelines for practice

The following sections examine the key concepts highlighted during the good usability outcome story, bad usability outcome story and the organisational-based vs usability consultant practitioner attribute differences. They were selected based on the number of coded references, number of usability practitioners that discussed the concept and the content of what has been said. Weight of numbers highlights importance and consensus among the usability practitioners and overall strength of discussion by usability practitioners. It can be assumed that an important concept that impacts on a good or bad usability outcome would be discussed by a majority of the interviewees.

5.5.1. Beneficial impact on usability outcome

In order to achieve a good usability outcome for a given project there must be a certain level of adherence to the twenty-seven concepts (discussed in Sections 4.3, 4.4, 4.5 and 4.6) and twelve relationship concepts (discussed in Section 5.1 and 5.2). In the main, complying with the concept will improve the usability outcome of a project. Complying with a large list of concepts is difficult in practice. That's why this section will examine a smaller list of key concepts that have been selected from the ones found in the good story discussion question in interviews.

Success Factors
Involvement by all project stakeholders enhances the collaborative approach
Project stakeholder relationships must be fostered
Making usability real to create a shared vision for project stakeholders
Usability goals promote a usability mindset
Crucial involvement by IS project team members
Nurture usability understanding

Table 5-9: Success factors drawn from key concepts emergent from good story discussion

During the interview, interviewees described a project where the usability outcome was good. The analysis revealed many concepts, which Table 5-9 presents a key set of concepts that were elicited from these stories. It can be said that these concepts were the most important,

as perceived by the usability practitioners interviewed, to achieving a good usability outcomes. These six concepts represent only two major themes, i.e. Usability Mindset and Collaborative Approach. The Project Constraints and Usability Practice themes were not prominent concepts during the good story discussions. Of the six concepts, three features in both the success and failure factors in this section and section 5.5.2.

These six concepts are also the core set of concepts that make up the following significant relationships discussed (Section 5.2) and significant relationship discussed within themes (Section 5.1):

- Usability mindset prevails beyond the project context (Section 5.2.1)
- Shared usability vision by all project stakeholders (Section 5.2.2)

Fostering project stakeholder relationships to maintain involvement (Section 5.1.6)

- Making usability goals real in project improves usability mindset (Section 5.1.2)

These relationships highlight the strong interlinked nature of collaborative approach and usability mindset themes. This reinforces the importance of this list of concepts and four relationship concepts highlighted.

The essence of these six concepts discussed is that collaborative approach and usability mindset themes are important consideration. In particular from a collaborative approach, the fostering of relationships to maintain involvement through a project lifecycle, the involvement and acceptance in usability activities by all project stakeholders, and the importance of involving IS project team members. Making usability real to project stakeholders, promoting usability goals, as a key part of mindset and nurturing usability mindset are important concepts to improve the shared usability vision for the usability mindset of a project and beyond. The relationship concepts highlight the importance of involvement to enhance the usability mindset for project and beyond, the fostering of relationship to maintain involvement and the making of usability real to project stakeholders to enhance their usability mindset.

5.5.2. Detrimental impact on usability outcome

When examining concepts that impact on the usability outcome negatively for a given project there must be a certain level of ignorance of the twenty-seven concepts (discussed in Sections 4.3, 4.4, 4.5 and 4.6) and the twelve relationship concepts (discussed in Section 5.1 and 5.2). In

the main, ignorance of the concept will degrade the usability outcome of a project. Complying with a large list of concepts is difficult in practice. So, to this end, we will examine the key concepts based on number of sources, coded references and overall strength of discussion by usability practitioners that were discussed during a bad story.

Failure Factors
Involvement by all project stakeholders enhances the collaborative approach
Organisational constraints external to project
Usability goals promote a usability mindset
Technological constraints
Create and follow the usability requirements
Project stakeholder relationships must be fostered

Table 5-10: Failure factors drawn from key concepts emergent from bad story discussion

During the interview, interviewees described a project where the usability outcome was bad. The analysis revealed many concepts, but in Table 5-10 represents these six concepts that were elicited from these stories. It can be said that these concepts were the most important, as perceived by the usability practitioners interviewed, which resulted in a bad usability outcomes.

The top six concepts represent three major themes, i.e. Project Constraints, Usability Mindset and Collaborative Approach. The Usability Practice theme had no prominent concepts during the bad story discussions. The technological constraints do not factor at all during the good concepts but are significant when the outcome is bad. Of the six concepts, three features in both the good (Section 5.5.1) and bad story concepts.

These six concepts are also the set of concepts that make up the following significant relationship (Section 5.2) and significant relationship discussed within themes (Section 5.1):

- Project constraints impact on usability goals (Section 5.2.4)
- Fostering project stakeholder relationships to maintain involvement (Section 5.1.6)

These relationships highlight the strong inter-linkage between of project constraints and usability mindset themes.

The essence of these six concepts presented, is that the project constraints theme has a significant impact on the collaborative approach and usability mindset themes. Various project constraints, especially technological constraints, have factored more prominently in a bad usability outcome. The fostering of relationships to improve involvement of project stakeholders may not have been as successful as needed to improve the usability outcome. The establishing, promoting and adherence to the usability requirements (including usability goals) have not been articulated or followed throughout the project lifecycle.

5.6. Summary

A key element of this research that has been highlighted in this chapter is the importance of enhancing the project stakeholder's usability mindset. This is done through careful consideration of the project constraints, usability practice and predominantly using a collaborative approach. This chapter has highlighted significant relationships that show the importance of both the usability mindset and the collaborative approach. Demographic data has shown other dimensions of relationships in the concepts.

The biggest impact on the usability outcomes is to what level project stakeholders can attain a usability mindset. The usability mindset has a spectrum of levels. It can be a simple acceptance of usability, understanding usability's value to the project, nurturing a shared usability vision for the project or creating a usability mindset that stakeholders can use beyond the project. Achieving a higher level of usability mindset predominantly relies on collaborative approaches in relation to performance of usability activities, along with consideration for project constraints.

Figure 5-14: Usability outcome theory - major themes and relationships

The major aspect of the concepts within the collaborative theme is involvement of project stakeholders. Maintaining involvement, fostering relationship for continued involvement and fostering involvement to establish and maintain a shared usability vision are key elements of involvement. Involvement is a crucial part of this theory. Figure 5-14 provides a summary of the themes and key relationships that define the elements of the framework that contribute to and guide the practice of improving the usability outcome for a project.Figure 5-15 provides a more detailed description of the various concepts that define each theme. In order to get a better feel for the interplay between the various actors and elements of this theory, specifically the project stakeholders and various activity-taking place in practice,

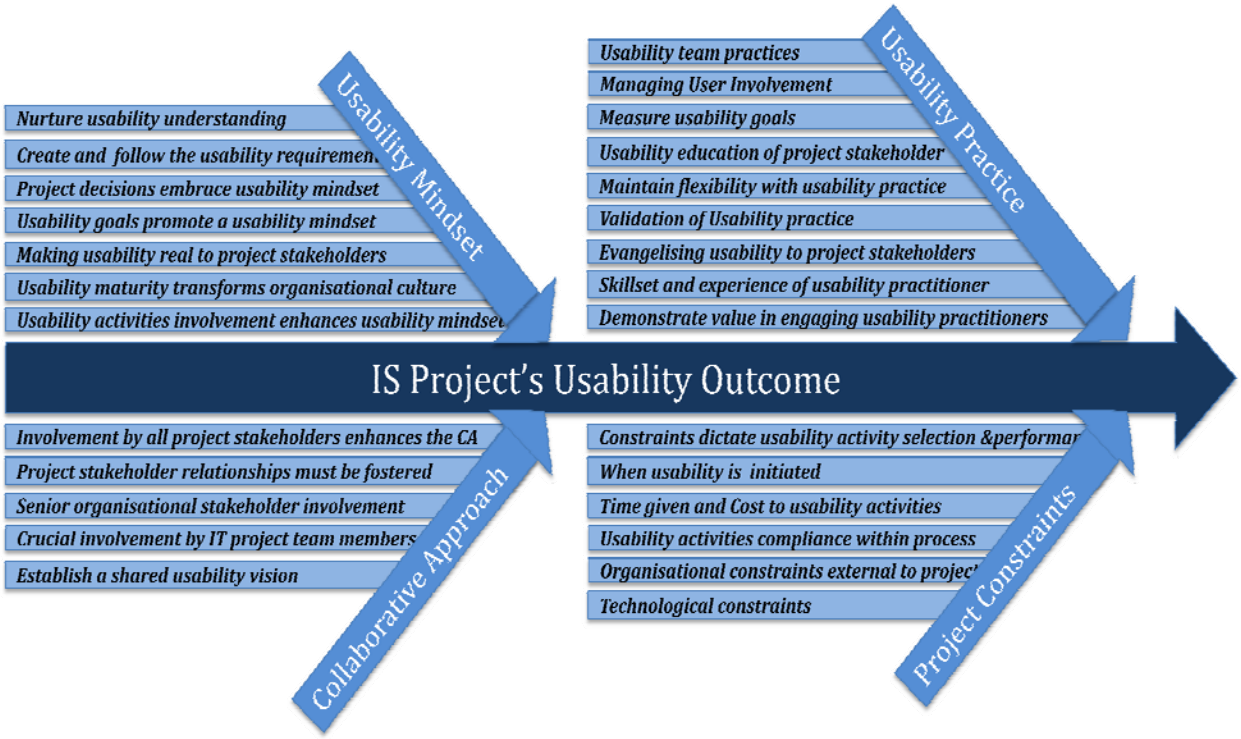

Figure 5-15: Set of concepts for each theme that define usability outcome theory

The rich picture shown inFigure 5-16describes key elements that have an impact on a project's usability outcome. It shows the various stakeholders (in orange) involved in a project, where the usability practitioner can be either a usability consultant or an organisationally-based usability practitioner. As part of the usability elements, with which the Users, Organisation and IS project team engage, you will find usability practitioners, usability activities, usability documents and a usability mindset. Organisational elements highlights marketing, legal issues, organisational infrastructure and organisational processes as elements that can impact on engagement and the usability mindset. The IS project team elements include the various members (i.e. project managers, business analysts and developers), vendors engaged to participate in the project and theIS infrastructure that constrains what is possible.

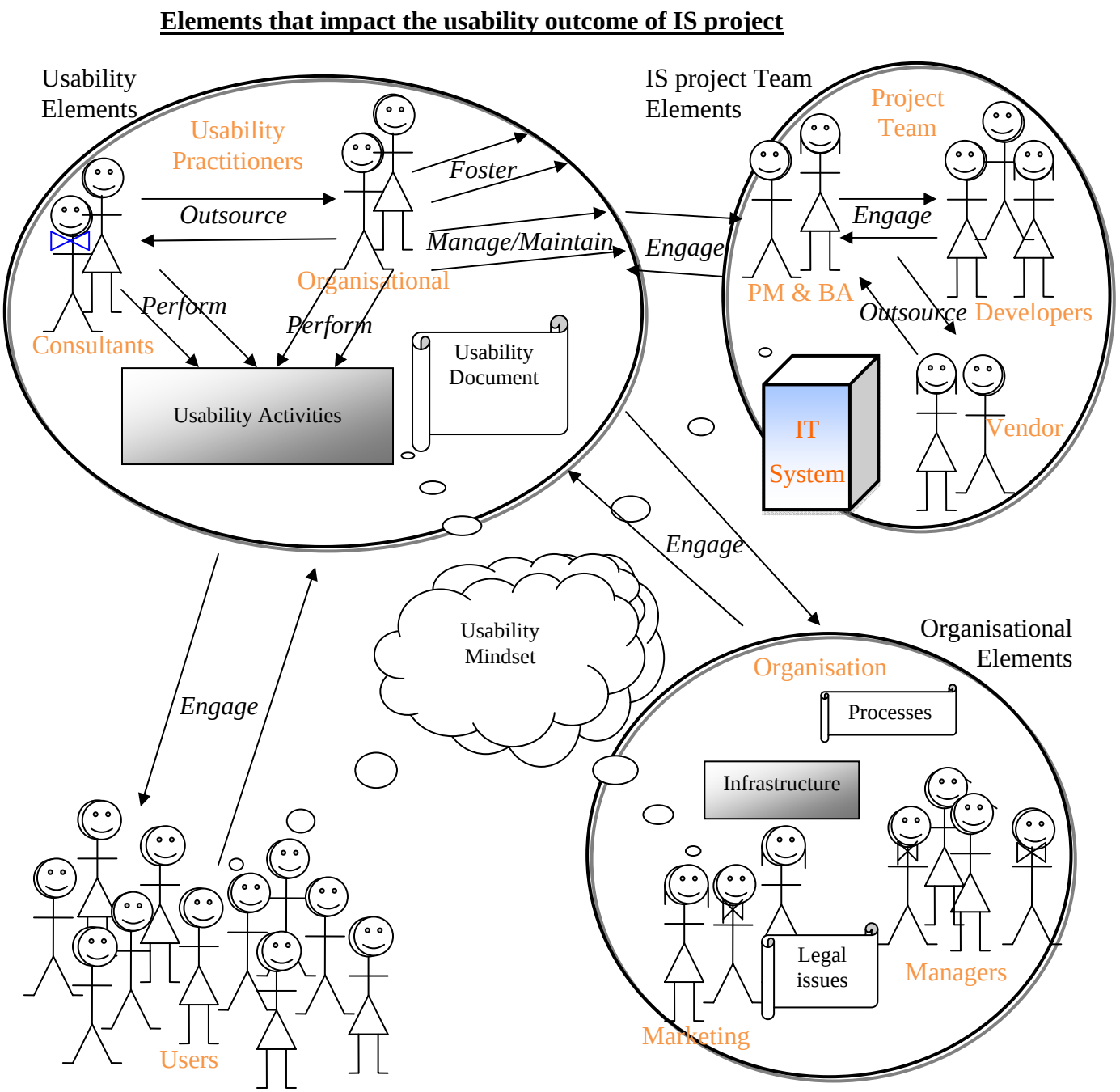

Figure 5-16: Interplay of key elements that impact on usability outcome theory

The rich picture provides an overview of the interplay between various elements that impact on the usability outcome theory. The activities in this rich picture (represented with two arrows with a word between the arrows) describe the basic activity occurring between actors (usability elements, organisation, users, IS project team andIS). These include:

- Engage
- Perform
- Foster
- Manage/Maintain
- Outsource

The collaborative approach is needed, with engagement required, whether it is through involvement via the usability activities or observation of usability activities or delivery of a presentation or reference to usability documentation. This includes the fostering, development and managing of relationship across the various project stakeholder groups. The outsource engagement occurred through engagement of external usability practitioner or engaging external vendors to run the project or implement elements of the project.

The development of the usability mindset is a key theme in this research (shown as a cloud with a set of thought links to all project stakeholders). This mindset cannot be simply established, maintained and adhered to by the usability practitioners only. It needs to be shared across all the project stakeholders. All project stakeholders will make a contribution to the usability mindset for a given project.

A collaborative approach is needed to enable project stakeholders to engage with the usability perspective, usability activities and develop a usability mindset. It is very hard to achieve a beneficial usability outcome without this engagement. This engagement is a two-way relationship between usability practitioners and other project stakeholders that incorporate:

- Involvement through participation in usability activities
- Involvement by observation of usability activities
- Involvement to gain understanding of usability mindset
- Involvement to enhance the usability mindset with their expertise
- Involvement to discover the usability goals for usability mindset
- Involvement to concord conflicting constraints or usability goals
- Maintaining involvement through the project lifecycle, from the start of the project

- Establishing a usability mindset across the project stakeholders for the entire project lifecycle. Usability consultants limited engagement results in a usability documentation acting as the memory for the usability mindset.
- Outsource engagement of usability consultants to supplement or validate organisational usability requirements
- Outsource engagement of usability consultant as a usability mentor for organisational usability practitioners.
- Usability practitioners must foster relationships with project stakeholders to setup the engagement with usability.
- Usability practitioner needs to manage and maintain the engagement with project stakeholders.
- Outsourcing engagement of vendors to implement theIS

The resulting framework, that includes the four themes, twenty-seven concepts, six significant relationship concepts and six strong relationships within the themes, have been compared to various literatures, in the next chapter. Providing an analysis that will show the framework, or parts of the framework, validated against other similar research. The conclusion and future research chapter will then follow the enfolding of literature chapter.

CHAPTER 6

6. Literature Comparison

This chapter will describe aspects of the literature that have provided results, whichare related to the findings discussed in Chapter 5. As described in the methodology chapter (Chapter 3), this enfolding of the literature is done as part of the research process. Elements of the discussion from this chapter and the analysis chapter will form the basis for the conclusion in the next chapter (Chapter 7).

The main aim of this chapter is to enfold the literature with the theory presented in this thesis by comparing and contrasting these findings of this research with the literature. This will provided some theoretical grounding for the theory generated. It will allow further analysis and synthesis of the generated theory in light of other research. It will also highlight gaps in the literature and allude to the contribution to knowledge discussed in the conclusion.

In order to achieve this comparative analysis and contrast with the literature, this chapter has been broken down into the four major themes of this research. Each of the themes will then be discussed in reference to their group of concepts with comparison to the related usability literature. The themes discussed are:

- Collaborative Approach,
- Usability Mindset,
- Project Constraints, and
- Usability Practice.

This chapter will also discuss the following:

- Examination of concept relationships emerging from this thesis,
- Analysis of a usability capability maturity model, and

- Summary ofthe supporting, emerging, and missing concepts from this thesis's theory.

The usability literature provides many papers that describe various aspects of usability activity performance. It predominantly addresses much of the evaluative usability activities and looks to improve their performance and the usability findings generated, in order to improve usability outcomes for a project.The literature used in this section has been presented in the literature review chapter (Chapter 2).

There are a number of literature articles that discusses the introduction of usability into an organisation, incorporating it into a project lifecycle, or introducing the performance of a usability activity. This body of research is discussed in more detail within the theme discussion. The main literature that is involved in the introduction of usability include: (Bloomer & Croft 1997), (Radle & Young 2001), (Wiebe 2000), (Buur & Bødker 2000), (Kerton 1997), and (Fellenz 1997).

An Australian study of twenty six information architects (Robertson, T 2004; Robertson, T & Hewlett 2004), with three to nine year'sexperience, provides the closest match to this thesis. The work has not continued, with the only two papers(Robertson, T 2004; Robertson, T & Hewlett 2004) published highlighting the study's initial analysis and one paper providing some early results and discussion (Robertson, TJ et al. 2003). The interviews were open-ended questions about the work information architects have been performing in industry practice, i.e. 'what is your role in a project?' The study was examining information architects' roles in a project. This focus differs slightly to the study in this thesis, but does focus on a similar set of professionals working with usability in industry. This study in its unfinished state provides a great set of initial findings that will corroborate many of the concepts that have emerged in this thesis. It was highlighted, in this preliminary study, that the traditional work done by information architects was not the only thing that occupied their work practice. The generic role of the information architect reported in the study was very compatible with the generic role of usability practitioners interviewed for this thesis.From this thesis' perspective the information architect's role as discussed in these papers (Robertson, T 2004; Robertson, T & Hewlett 2004; Robertson, TJ et al. 2003) is not dissimilar to the generic role discussed in this thesis of a usability practitioner.

6.1. Collaborative Approach

The collaborative approach theme incorporates five emerging concepts in this thesis. These concepts are compared alongside the literature to highlight where they are supported, opposed, not covered or where gaps exist. The collaborative approach looks to active involvement as project stakeholders in IS projects to improve usability outcomes.

A similar study of usability practitioners alludes to a collaborative approach as an important part of performing usability, saying, 'usability input is a more ongoing collaborative effort, and an official reporting-back stage is not suitable'(Furniss, Blandford & Curzon 2008). The major aspects of this study of eight usability practitioners were to foster relationships, communication and coordination of project stakeholders. The owner of the usability function within a project is often discussed; when it's not about ownership, it's about focusing on collaboration, because a multi-disciplinary team working together can improve the user experience and usability outcomes of a project (Anderson, R et al. 2005). The question asked in the discussion by Anderson et al. (2005) is 'How do you manage the kind of collaboration that leads to real change?'

Involvement is a key part of the collaborative approach theme. It is the corner stone of a successful usability outcome. This theme has a very strong concept that focuses on all project stakeholders[21] being involved in usability activities, i.e. 'Involvement by all project stakeholders enhances the collaborative approach'.Gulliksen(2004) highlights involvement in the results from his survey of Swedish usability practitioners. Billingsley (1995) also describes 'support and incentive for developer involvement'recognising the importance of getting developer involvement in usability. A practical guide (Damodaran 1996) to user involvement discusses participation, support, issues, elements of involvement and roles played in involvement, which is detailed in the literature review. This thesis, in addition to Damodaran's(1996) discussion on the role of involvement, adds to the need for involvement to include the education of usability mindset and eliciting of project constraints and usability goals for the project. This means the involvement would allow for a four-fold benefit to the project:

1. Participation in usability activities to generate usability findings.

[21] Discussion of the various project stakeholder groups is shown in Section 4.2.

2. Observation of usability activities enables other project stakeholders to see value of usability.
3. Opportunity to education or increase understanding of project stakeholders engaged in the project usability vision.
4. Allows for further enhancement of the usability mindset for project, by eliciting project constraints and additional usability goals.

In this research, the project stakeholders that need to be involved is specified as all stakeholders, but especially the primary users, IS project team members and senior organisational stakeholders. Gulliksen(2004) in his top five factors that are important to usability work specified support from project managers, management, users and acceptance from the software developers. Rosenbaum et al. (2002) in the lessons learnt from the usability in practice forum also discusses the need for support by all project stakeholders during usability practice, which includes developers, and senior management (from the top to the bottom in an organisation hierarchy). This literature looks to supportonly, which is not the involvement (active participation/direct involvement) highlighted in this thesis.

The engaging of a vendor and the resulting agreement, as discussed by Artman(2002), looks at how the procuring of usability requirements must explicitly request stakeholder involvement in usability activities by all stakeholders, including IS project team members. This research is focused on outsourcing arrangements that must highlight the usability components in the agreement, to improve the usability outcome of a project. But, it further highlights the importance of involvement to enhance usability for a project. There is a lot of literature that focuses on involvement of the primary user (Barki & Jon 1994; Hartwick & Barki 1994; Kujala 2003; Mackay et al. 2000; Muller et al. 1998) in usability activities to improve usability outcomes for a project. A recent study described the necessity for involvement of a domain expert in complex domains to bring the domain knowledge to the usability mindset, or for usability practitioners to be trained in a specific domain or hiring usability practitioners with the specific domain expertise (Chilana, Wobbrock & Ko 2010). The consideration of a user (or having user advocates) is an important issue, but this does not discount consideration of the contribution to usability by business/organisational issues and technologist issues (Sherman 2006). This thesis did highlight involvement to gain domain expertise in a project, while other forms of acquiring domain expertise were not mentioned. Involvement provides the best option

with generation of usability findings, creation of a shared vision and incorporation of stakeholder expertise (constraints and goals) to usability mindset.

This research describes various*types of involvement* in usability activities: firstly, the active participation of primary users in usability activities, this is often for an evaluation purpose; secondly, to observe usability activities being performed and experience the usability issues as they occur; thirdly, involvement in usability activities provides an opportunity to elicit usability goals and project constraints; lastly, through the communication of usability findings, which can be by presentation or within a usability document.

The literature also highlights various types of involvement. Barki and Hartwick(1989) describes a clear difference between 'user participation' and 'user involvement' which relates to the primary users. Kappelman(1995) agrees with this distinction and goes further to identify a distinction between psychological involvement with the usage of the IS and the psychological involvement with the process of developing and implementing the IS. User participation is defined as the observable behaviour of primary users in the project lifecycle, while user involvement is defined as their attitude towards the IS and the project lifecycle (Kappelman & McLean 1991, 1992). This research goes further in saying that user participation is sought first, then user involvement that leads to IS success. This research wants more from project stakeholder involvement, which compares favourably to this thesis seeking more from involvement as described by the HUMCA (Section 5.2.7).

Other research by Franz and Robey(1986) has described involvement as the users' influence during the project lifecycle, where users perform activities that influence particular parts of an IS. Ives and Olson (1984) describe involvement by type of participation and degree of participation. The type of participation can vary from indirect (where user representatives participate in the project) to direct (full participations by the users themselves). The degree of participation relates to the amount of influence the user actually has on the design of the IS, which can range from no influence to having strong control. This research has highlighted direct participation as the goal of usability practitioners. The usability practitioners did mention being user advocates (indirect participation) if user involvement could not be achieved, but preferred full participation.

The *goal of user involvement*, in the literature by Følstad(2005), is to provide input into the project lifecycle that looks to improve usability of IS and discusses enabling user participation to improve user ownership, increase acceptance and minimise resistance to a new IS. This

agreeswith the outcomes of this thesis, which also looks to gain more than usability findings from stakeholder involvement. Where this literature(Følstad 2005) looks to improve ownership and acceptance to minimise resistance, this thesis looks to build usability mindset across the project with all project stakeholders through this involvement.

Senior organisational managers are a distinct group where involvement was highly desirable. In this thesis‘Senior organisational stakeholder involvement’ is a concept that has emerged and allocated to the collaborative approach theme. This has been discussed in the literature from various perspectives. Rosenbaum et al. (2000) describes the importance of high level management sponsorship and/or supportto gain acceptance and involvement by other stakeholders. The raising of awareness among management about their role as supporters of usability activities and as a driving force behind the change process (to enhance the usability mindset) was also discussed by Gulliksen et al. (2004). Trenner and Bawa(1998) discuss the political issues in performing usability in industry, finding that key lessons learnt in performing usability include gaining sponsorship and management support. The *introduction of usability*literature highlights ‘Management support and communication’(Radle & Young 2001), ‘Support from upper management’(Fellenz 1997) and ‘Importance of building sponsorship’(Kerton 1997) as important drivers for introducing usability at an organisational level and within the project lifecycle. The literature highlights two distinct perspectives in senior management involvementand while this thesis supports this involvement, it does not discriminate between them. Firstly, it is important that senior management sponsors and/or supports (indirect participation) usability activities in a project and across an organisation. Secondly, this involvement of senior managers can improve their usability understanding and maturity (direct participation) to enable better decision-making processes that includes consideration of usability. Bryde(2008) discusses this distinct difference between a project senior sponsor and project champion. The difference is the level of involvement with the project, from support at various points in a project through to day-to-day involvement. A sponsor provides external support while a champion provides internal support. This thesis looks to have senior management developing usability understanding for the project and beyond, becoming usability champions.

A survey on integrating usability (Venturi & Troost 2004) into a project lifecycle showed the importance of management support in providing the appropriate resources and infrastructure, communication between project stakeholders, and an interest by the organisation in improvingusability understanding. This further reinforces the need for senior management

support and the need for foster relationship to improve communication that has been discussed later.

This thesis has also highlighted the importance of IS projectteam member's involvement in usability activities. This may include, for example, the project manager, business analyst, and/or developer (Section 4.2). The concept in this theme that focuses on this is 'Crucial involvement by IS project team members'. This concept has been highlighted by the numerous pieces of literature (Artman 2002; Billingsley 1995; Gulliksen et al. 2004; Rosenbaum et al. 2002). The literature discussed how crucial it is to involve developers whoactually implement the system, to communicate with and develop a shared usability vision for the project (Rosenbaum et al. 2002). Billingsley (1995) discussed 'Support and Incentive for Developer involvement', suggesting the use of incentives, such as 'performance measurements'(Radle & Young 2001), for developers to consider the usability perspective, especially when usability is first introduced. Practitioners interviewed did not discuss incentives as part of this research.

This concept of involving IS project team members is critical in the success of usability for a project. In their discussion Rosenbaum et al.'s (1999; 1998; 2000), suggest that strategic usability highlights the importance of usability practitioners work to involve ICT project team members through 'firsthand observation followed by participation'.

Rosenbaum (2002) discusses the development of a *shared usability vision* for the project, with reference to communicating essentials of usability to project stakeholders and education of new project stakeholders. The establishing of a usability understanding with project stakeholders is an important way to improve usability outcomes, indeed Artman(2002) describes this as a key requirement when procuring usability requirements. This research highlights that establishing collaboratively a shared usability vision is crucial, i.e. 'Establish a shared usability vision' concept. The difference between this concept and literature is that this directly address a collaborative establishment of a shared usability vision for a project, whereas the literature looks to create usability understanding to enable usability to be taken more seriously in a project by project stakeholders.

The *communication and development of relationships*with project stakeholders is highlighted in this concept 'Project stakeholder relationships must be fostered'. Robertson & Hewlett (2004), Rosenbaum (2000), Venturi &Troost(2004) and Furniss et al. (2008) all discuss that better communication can have a beneficial impact on usability activities and resulting usability findings. Gulliksen(2004) describes the need for usability practitioners to spend more time

developing the relationships to improve stakeholder involvement, especially during theimplementation phase. Wiebe(2000) describes ‘Group dynamics’ as important for creating effective workgroups, which means that fostering of good relationships within a set of project stakeholders is an important part of creating good group dynamics. Cooke et al. (2005) describes the need for usability education to focus on ‘critical assessment and communication skills’, further highlighting the need for usability practitioners to have good skills in presentation, written and interpersonal skills. Furniss et al. (2008) and Ferrara (2005) both describe the importance of fostering relationships to improve usability.

> *“UX professionals can successfully maintain positive team relationships without sacrificing decision-making power. Different viewpoints are inherent in project teams, but should not cause personal offense or harm usability. Working to build positive relationships improves team synergy and leads to the design and development of better user experiences and speedier product rollouts.” (Ferrara 2005)*

Each concept in this theme has links with research done in the literature. The key involvement concept has a good coverage of literature highlighting its importance to usability. Establishing a shared vision with project stakeholders and fostering project stakeholder relationships are not directly addressed in the literature, even though there is some literature that alludes to its importance. This research promotes these two concepts as important. First, the fostering of relationships is needed in order to facilitate the other more prominent concepts. Second, establishing a shared vision in collaboration with and through involvement of project stakeholders provides an important first step towards the building of a usability mindset.

In summary, there is a consensus amongst the literature and this thesis that involvement of all project stakeholders in usability is important. However this research promotes more direct and active participation rather than just indirect and support orientated participation. Therefore, it is preferred that IS project team members and senior management don’t simply support usability in the project lifecycle, but are actively and directly involved with it. The literature highlights better communication, group dynamic and more time to focus on stakeholder involvement as important ways to foster relationships. This thesis definitively places the fostering of stakeholder relationships as an important precursor to establishing a long-term relationship to gain involvement throughout a project lifecycle. Finally the collaborative theme, through this direct and active involvement of project stakeholders, should establish a shared project usability vision, which the literature looks to improve through usability understanding.

6.2. Usability Mindset

The usability mindset theme incorporates seven emerging concepts in this thesis. These concepts are compared along side the literature to highlight where they are supported, opposed, not covered or gaps exists. The usability mindset looks to describe the importance of developing an understanding of usability to improve usability outcomes.

The articulation of *usability requirements* for a project is an important initial step for a project usability mindset. The concept that has emerged in this research is 'Create and follow the usability requirements concept that requires the setting of usability goals, scope and a plan for the project. Articulation of usability requirements and goals is an important part of procuring usability requirements from a vendor (Artman 2002). This is an important part of setting the usability vision at a project level. Billingsley (1995) at another level, discusses a strategic usability planning perspective, looking to create an organisation vision for usability. This is highlighted in the concept 'Usability maturity requires transformation of the organisational culture', that looks to usability beyond the project at an organisational level, where usability maturity is improved.

The creation of a*shared usability vision* is another emerging concept, i.e. 'Making usability real to create a shared vision for project stakeholders' within the usability mindset theme. The making of usability real is not discussed directly in the literature. It is alluded to in the introducing usability literature by Bloomer and Croft (1997), that getting the usability message across using presentations, walking corridors, seeing with their own eyes and demonstrating value are ways in which usability is made real to project stakeholders. Kerton(1997)discusses how sharing usability learning throughout a project, across the project stakeholders, is important when introducing usability. This introduces project stakeholders to usability concepts by improving understanding. Another author discusses that when introducing usability that the 'effective communication of the vision in ways that continued to enhance commitment' to usability (Wiebe 2000). These studies provide elements of creating a shared usability vision. This thesis combines the making usability real concept with creating a shared vision, showing an important relationship between the two distinct concepts, which are presented separately in various literatures.

Improving and promoting *usability understanding* was an important concept in this thesis, i.e. 'Nurture usability understanding'. When introducing usability into an organisation the

'Awareness level'(Radle & Young 2001) provides a gauge of the usability knowledge and understanding within an organisation, which is important for improved usability value. Artman(2002) highlights the importance of developing 'Usability Understanding' as part of the usability requirements in a procurement agreement. Increasing the knowledge about HCI and usability among all stakeholders involved in project was important in the survey conducted by Gulliksen et al. (2004). Robertson and Hewlett (2004) discuss the need to educate and/or mentor project stakeholders to improve understanding of the concept of usability and the need for usability practitioners. Usability practitioners are like change agents(Rogers 1995), who can help improve a project stakeholder's usability understanding(Sherman 2006). Rosenbaum (2002) discusses the requirement to educate new and old stakeholders in the usability value and understanding.

Other research (Jerome & Kazman 2005; Juristo et al. 2007) discusses the need for mutual understanding between usability practitioner and developer activities and roles in a project lifecycle. This research looks to educate developers in the role of usability practitioners and visa-versa. It's only through mutual understanding of each other roles that effective communication can better serve the goals of usability.

Transforming the*usability maturity*of an organisation is important for sustained and valuable usability project engagements. This research highlights this with the concept 'Usability maturity requires transformation of the organisational culture'. Changing organisational culture is slow, but with stakeholder advocates and influence from key high-level management, dedicated individuals from the majority of the project stakeholders groups, it can move the organisation to a desired future state (Sherman 2006). Strategic usability (Humburg, Rosenbaum & Ramey 1996; Rosenbaum, Rohn & Humburg 2000) describes the embedding of usability into an organisation's process and culture as an important way to improve maturity. Billingsley (1995) discusses at a strategic level the need for a usability plan that looks to create an organisational vision for usability. This looks to formalise the change required from the organisational culture to transform and begin the journey to embrace usability and improve usability maturity. This literature corroborates the findings of this thesis's concept that usability maturity needs to be increased through transforming the organisational culture.

It is not enough to perform *usability activities*, generate usability findings and involve project stakeholders in usability activities to improve usability findings. Wiebe(2000) describes how 'understanding application of usability activities is not a substitute and does not match understanding of usability in practice', which provides an interesting insight covered by

'Usability activities involvement enhances usability mindset' concept in this thesis. The performance of usability activities is more effective when coupled with an improved usability understanding, by project stakeholders, of its value in practise which builds on the usability mindset. Fellenz(1997) also highlighted involvement of IS project team members during design activities to gain feedback and enable first hand observation of user problems. This thesis highlights the involvement to enhance usability mindset but also touches on the making usability issues real as discussed in the 'Making usability real to create a shared vision for project stakeholders' concept.

In summary, creating and following usability requirements, the need for organisational culture change to increase usability maturity and nurturing usability understanding are well established in the literature. The combination of making usability real and creating a shared usability vision was not found in literature, but individually covered in various literature. The involvement in usability activities helps develop a usability mindset is alluded to in the literature as it alludes to the making it real perspective. The project decision embracing the usability mindset was not discussed in the literature examined. This concept is touched on in the usability capability maturity (UCM) section (Section 6.6) and relates to the enculturation level of a UCM, which is the highest level of maturity attainable.

6.3. Project Constraints

The project constraint theme incorporates six emerging concepts in this thesis. These concepts are compared alongside the literature to highlight where they are supported, opposed, not covered or where gaps exist. The project constraint theme describes various concepts that can impact on the usability outcomes.

The most *common project constraints*found in the literature highlights this thesis's concept 'Allocating resources to usability activities'. Rosenbaum et al. (2000) described 'Resource Constraints' as an obstacle to strategic usability, with consideration for time given, budgetary limits and stakeholder involvement limits. Fellenz(1997) also discussed 'Understanding resource limitations' when introducing usability into an organisation or project for the first time. Robertson and Hewlett (2004) discuss 'warfare' among project stakeholders who are competing for various project resources and are limited by project constraints. These studies highlight time given and cost, but also include limits on stakeholder involvement, issues this thesis highlights in the collaborative approach theme (i.e. problems with gaining project stakeholder involvement

were included in the 'Involvement by all project stakeholders enhances the collaborative approach' concept).

The *selection and performance of usability activities* is often constrained by various project elements. The effective performance of usability activities (Vredenburg et al. 2002) requires that they are identified based on perceived key benefits and weakness. In other words, the selection of usability is dictated by the project constraints and the flexibility of the usability practitioner to achieve effective usability findings. This selection and sequencing of usability activities to maximise the effectiveness of the generated usability findings is highlighted by Billingsley's(1995)five critical success factors. Selection of usability activities is often made with consideration for the 'best bang for buck'(Rosenbaum, Rohn & Humburg 2000). The cost benefit tradeoffs play an important role in adoption of usability practices (Vredenburg et al. 2002), therefore the selection of usability activities to perform is impacted on by the required costs and resources. This literature provides good coverage of the concept 'Constraints dictate usability activity selection & performance' from this thesis.

The literature also highlights the need to increase the explicit*support for usability activities* and its role in the project lifecycle (Gulliksen et al. 2004). The usability activities selected are often participatory type activities, which rated highly in the survey of usability practitioners conducted by Gulliksen et al. (2004). Rohn et al. (2002) describes employingusability activities for more than producing valid usability data, but also to engage involvement across all project stakeholders. The usability practitioners interviewed predominantly mentioned participatory orientated usability activities, which corroborates with the literature focus and survey results. Integration (Kerton 1997; Radle & Young 2001) of usability activities into the project lifecycle can help to introduce usability into an organisation. The literature also discusses integration of usability activities into various project lifecycle methodologies (Ågerfalk, Par J., Goldkuhl & Cronholm 1999; Anderson, J et al. 2001; Ferre 2003; Seffah, Desmarais & Metzker 2005; Sousa, K, Furtado & Mendon 2005; Sousa, KS & Furtado 2003; Venturi & Troost 2004). In this thesis this aspect did not emerge from the data, other than 'Usability activities compliance within a project lifecycle' concept, but this focuses on maintaining usability activity performance that already exists as part of a project lifecycle.

The point in a project lifecycle when *usability is engaged*to perform usability activities can play a significant role in ascertaining its value to the project and its effectiveness in the project. This thesis describes such a concept, i.e. 'When usability is initiated'. Vredenburg(2002) discusses the importance of 'End-to-end user involvement in project' in respect to primary user involvement in

usability activities, which is desirable but should include all project stakeholders. Rosenbaum et al. (2000) discusses 'lack of early involvement'as a potential obstacle to usability. The literature discusses this issue from the point of view of getting project stakeholder (predominantly the primary user) involvement. Whereas, this thesis has more of a focus on the usability practitioner's initial engagement in the project lifecycle, preferring engaged from end-to-end in a project. Once a usability practitioner is engaged this is a precursor to project stakeholder involvement being fostered and managed. Iivari(2006) discusses various usability practitioner roles within an engagement in a project. These roles can dictate when, during a project lifecycle, they are engaged. The consultative role can lead to engagement anytime through a project lifecycle, but it's found they are engaged predominantly towards the end. The participative role or configurer role requires an end-to-end commitment where the usability practitioners is part of the IS project team.

Various *organisational constraints* can impact the project constraints for a project, as discussed in the 'Organisational constraints external to project' concept. Fellenz(1997) discusses whether an organisation is ready to invest in usability, which was not discussed in this thesis. An assumption was made that organisations were ready, because they had involved usability practitioners, no matter the level of usability maturity, to consider usability in a project lifecycle. Rosenbaum (2000) discusses the resistance to 'user-centered design/usability' being lack of management interest/respect/support, organisational usability mindset slow to change, value not seen in usability, and IS project team members resistant to it. All of these are organisational constraints that impact on a project. This thesis highlighted various organisational constraints (see Section 4.5.5). This thesis concept also discussed the need for a usability champion from the organisational stakeholders to aid in the elicitation of organisational constraints, which is discussed further later.

The role played by the*technological issues*is highlighted in this thesis, 'Technological constraints concept. Dayton (1993) in his list of usability practitioner skills discusses the importance of usability practitioners understanding technological issues. This concept was rarely discussed in the literature, except in Dayton's (1993) paper that presents it as a usability practitioner skill, not as directly impacting usability outcomes for a project. Robertson and Hewlett (2004) also highlight the impact of technological constraints on the usability practitioner's practice. There is some research that highlights the need for usability practitioners to better understand the developer's role (Jerome & Kazman 2005; Juristo et al. 2007) and vice-versa. Theliterature and this thesis show thatusability practitioner needs to foster relationships with developers in order to

improve communication, which will enhance understanding and consideration of technological issues in a project.

In summary, the various project constraint concepts were discussed in the literature. The time given and cost of performing usability was prominently discussed. The initiation of usability was discussed from an involvement of project stakeholder's perspective, where this research highlighted usability practitioner engagement, which is expected when interviewing usability practitioners. Integration of usability activities into a project lifecycle was highlighted in literature, but this thesis highlighted compliance with existing usability activities in project lifecycle. The understanding of the technological constraints highlighted in this thesis was described in some literature and also discussed as a required skill for usability practitioners.

6.4. Usability Practice

The usability practice theme incorporates nine emerging concepts in this thesis. These concepts are compared alongside the literature to highlight where they are supported, opposed, not covered or where gaps exist. The usability practice looks to describe the roles and practices that usability practitioner's perform, which can improve usability outcomes.

The *usability champion* or experienced usability practitioner is needed when usability maturity is low with project stakeholders and/or organisation. This champion is being discussed in this section because part of a usability practitioner's practice is to evangelise, sell and educate projectstakeholders. The usability champion role was highlighted in two other concepts, i.e. 'Organisational constraints external to project' to aid in the elicitation of constraints and 'Making usability real to create a shared vision for project stakeholders' to help make usability real to project stakeholders. The five critical success factors, described by Billingsley (1995),discussed using an experienced usability practitioner to take the usability lead role and 'High level Champion' organisational level stakeholder to promote the importance of usability. Bloomer and Croft (1997) discussed the need for a usability champion when introducing usability into an organisation. Wiebe(2000) also discusses the requirement for a usability champion to promote the value of usability to the organisation. A usability champion improves usability practice and helps promote usability to project stakeholders. Developing a usability champion for a given project is a great way for a cross-disciplinary team to incorporate the usability mindset and usability practice(Sherman 2006). Usability champions are not just restricted to usability practitioners, other project stakeholders need to be cultivated. The 'Evangelising usability to

project stakeholders' concept incorporates the need for a usability champion to gain a usability foothold in a project and develop usability further. The selling or evangelising of usability can also take the form of presentations, walking corridors, seeing with their own eyes and demonstrating value (Bloomer & Croft 1997), especially when introducing usability. This concept is also highlighted as an important usability practitioner skill, with evangelising and selling of usability both discussed by Dayton (1993). The literature highlights the various aspects of the concept that has emerged in this thesis, i.e. need for usability champion, role of usability evangelist and being able to sell usability.

*Educating*project stakeholders about usability understanding (Robertson, T & Hewlett 2004; Rosenbaum, Rohn & Humburg 2000) is another important part of usability practice. Rosenbaum (2002) goes further and discusses education of new and old stakeholders in the usability value and usability understanding. Robertson and Hewlett (2004) discuss education and mentoring as approaches to improve usability understanding. A usability practitioner's skillset must include education of project stakeholders on the concept of usability and usability activities (Dayton 1993). Even in an outsourcing agreement, Artman(2002) requires education of usability understanding for project stakeholders from the vendor. This highlights development of a usability mindset through direct involvement in educational activities. This literature has synergy with the 'Usability education of project stakeholders' concept.

The *flexibility needed* by usability practitioners in their performance of usability activities is important in getting value out of usability activity performance and project stakeholders' involvement. This thesis provides a concept 'Maintain flexibility with usability practice' that highlights this. Similarly, Robertson and Hewlett (2004) designate this as 'a must' when involved in a 'hostile' environment not mature in the concept of usability. Artman(2002) discusses having a 'Flexibility and an iterative approach' as important for the usability requirements when outsourcing projects to vendors. Another study discusses the flexibility and iteration in the performance of usability activities as important for usability practice (Rosenbaum et al. 2002). Garrety and Badham(2004) when introducing the performance of usability activities in an organisation's processes discovered that 'No matter how well thought out and well argued they are, UCD methods cannot capture all possible contingencies and render them controllable'. Each project context contains its own set of issues to be considered, which require flexibility in performance of usability activities. The literature captures the essence of this thesis's concept, both suggesting that there must be value attained from the performance of usability activities and

flexibility in performance. There is more of a focus of employing an iterative process in the literature not discussed by concepts in this thesis.

When the literature discusses the performance of usability activities at this concrete level it inevitably looks at the process of technique and outcomes of technique used. Hornbæk and Stage (2006) describe four challenges when looking into performance of UEAs: ‘

- *What forms of design products gives the best evaluations,*
- *How do we most effectively focus an evaluation so as to give pertinent results,*
- *What kinds of feedback are most useful in design, and*
- *How do we support prioritizations, analysis, and recommendations about what to do with the results of usability evaluations?’*(Hornbæk & Stage 2006)

The above list of challenges in the performance of usability activities highlights flexibility and the importance of discovering usability findings and what to do with these findings. It is missing two important aspects from this thesis’s perspective, the importance for project stakeholder *involvement* (if possible) and the development of a *usability mindset* through this performance of usability activities. Maybe one more challenge needs to be added:

- Achieving involvement in an evaluation to improve outcomes and build usability mindset with and for all project stakeholders

Measuring of the usability goals for a project is an important usability practice for practitioners, i.e. ‘Measuring usability goals’ concept. Artman(2002) discussed the importance of articulation of usability requirements and goals with ‘measurable attributes’, while eliciting and measuring usability goals to establish worth of usability in a project was discussed by Rosenbaum et al. (2002). To gauge the effectiveness of performing usability activities (Vredenburg et al. 2002) you may look to track customer satisfaction that implies usability goals and measurements. The literature covers the various aspects of the concept in this thesis, i.e. importance of articulating measurable attributes, measure to gain credibility and measuring to ascertain effectiveness of usability activities.

The practice of *usability in a team* or as an individual is discussed in this thesis in the ‘Usability team practices’ concept. Vredenburg et al. (2002) agrees that usability had a higher impact on the project when there were two or more usability practitioners involved. In different research, Radle and Young (2001) discuss the importance of ‘Integration into the team, which promotes placing usability practitioners into the IS project team to improve usability understanding in the

team.This was not something specific that emerged in this thesis, but it does highlight working in teams and links to the collaborative theme with involvement of IS project team and usability mindset theme with improving usability understanding. The literature reinforces the usability practitioner teamwork concept (as discussed in this thesis) and highlights working within the IS project team to improve usability understanding.

The *skillset of a usability practitioner* plays an important role in a practitioner's engagement with a project. A high skillset is a valuable resource for a project and can increase usability importance to a project. This research has highlighted this with the 'Skillset and experience of usability practitioner' concept. A lack of trained usability practitioners (Rosenbaum, Rohn & Humburg 2000) can be an obstacle to usability. Robertson and Hewlett (2004) consider it even more important to consider the skillset of the usability practitioner when performing usability activities in a 'hostile' environment in order to maximise the attainable usability outcome. Dayton (1993) provides a comprehensive list of usability practitioner skills and attributes (Table 2-10 in the literature review) required to be an effective usability practitioner.The key skills and attributes that have emerged in this thesis that agree with Dayton (1993) findings include: Knowledge of usability and usability activities, commitment to users, the need to be evangelistic, domain knowledge, understand project lifecycle, understand technological issues, being a team players, able to sell and convince people of importance of usability, keep all project stakeholders involved, be able to educate, be able to resolve conflicts and mentoring ability. Many of these skills reflect in the concepts that have emerged in this research, see Table 6-1. The 'Be able to resolve conflicts' is discussed in two concepts, as shown in Table 6-1, where usability goals or organisational constraints may conflict or compete, requiring the usability practitioner to resolve this conflict and reach a concordance.

Dayton (1993) Skill	Related Concept
Knowledge of usability and usability activities	Skillset and experience of usability practitioner
The need to be evangelistic	Evangelising usability to project stakeholders
Understand technological issues	Technological constraints
Being a team players	Usability team practices
Able to sell and convince people of importance of usability	Evangelising usability to project stakeholders
Keep all project stakeholders involved,	Project stakeholder relationships must be fostered
Be able to resolve conflicts	Organisational constraints external to project Usability goals promote a usability mindset
Be able to educate & Mentoring ability	Usability education of project stakeholders

Table 6-1: Comparison of Dayton (1993) usability practitioner skill against related concept from theory

Other aspects, discussed by Dayton (1993), that may improve the skillset of the usability practitioner, but have not been highlighted by this thesis include: communication skills such as the ability to listen, interview, write, speak, influence and encourage. Radle and Young (2001) discuss the 'HFE resources', which describes a human factor engineer (usability practitioner), and the importance when introducing usability to understand the skillset and experience of stakeholders in relation to usability. It also goes on to discuss the importance of ongoing improvement to practitioner's usability skillsets and experience. This thesis did not highlight all the skills required by usability practitioners, but it covered the major skills discussed by Dayton (1993).

The literature does discuss the performance of usability activities and the effect that usability practitioners have on the usability findings generated (Gray & Salzman 1998a, 1998b; Hertzum & Jacobsen 2003), but these were not mentioned by this thesis. The literature predominantly looks at expert evaluation (usually '*cheap/discount evaluations*'(Nielsen 2009)), whereas the practitioners interviewed seemed to discuss onlyparticipatory usability activities that allowed or required project stakeholder involvement. The literature predominantly highlights the performance of expert only research literature, as a cheap and quick alternative (Nielsen 2009). This thesis has highlighted the performance of participatory usability activities and looks to expert evaluations as a second best option.

In order to *improve usability value* within a project and organisation it needs to take hold in the 'margins' and looking to having 'small gains'.(Sherman 2006). Robertson and Hewlett (2004) allude to the importance of generating value with stakeholders in the concept of usability and the need for involvement of a usability practitioner. These compare favourably with 'Demonstrate value in engaging usability practitioners' concept that highlights usability practitioners need to improve their perceived value to a project or organisation and the value of usability activities. A usability champion is required to encourage the value of usability to an organisation (Wiebe 2000). The literature highlights taking small steps and looks to a usability champion to improve the value of usability to an organisation. This thesis concept is more focused on improving the value placed on engaging a usability practitioner.

In summary, there was good coverage of the concepts for this theme in the literature with such things as: need for usability champion, role of usability evangelist, being able to sell usability, need for usability education, measuring of usability goals, and flexibility in performance of

usability activities to attain value. The literature reinforces the usability practitioner teamwork concept (as discussed in this thesis), but also highlighted working within the IS project team to improve usability understanding. This thesis did not reveal a comprehensive set of skills required by usability practitioners as covered by Dayton (1993), but the main skills have been covered. Participatory orientated usability activities were prominently discussed in this thesis, but usability practitioner effects or expert orientated usability evaluations were not covered by this thesis, whereas the literature has a heavy focus on expert evaluations. The literature discussed small steps to improve usability value, while this thesis highlighted improving the value in engaging a usability practitioner. Finally, this thesis discussed the validation that occurs with external usability consultants and the additional overhead of the management required to facilitate project stakeholder involvement that did not have a directly related discussion in the literature.

6.5. Relationships

The significant relationships that create a symbiotic relationship between collaborative approach and usability mindset is alluded to by Fellenz(1997) in the discussion about building usability credibility. The research describes usability education of project stakeholder's that benefits usability and help develop relationship of trust and mutual respect (Fellenz 1997). This shows that improving the usability mindset of project stakeholders (through education to improve usability understanding) can help develop relationship with the project stakeholders that enhance collaborative approach.

This idea of *involvement to build a usability mindset* is a key relationship (discussed in Section 5.2.1 and 5.2.2) among the themes in this research. Swanson (1974) describes various levels of involvement with an MIS, see Figure 2-7 in literature review. These levels of involvement, when compared with corresponding concepts from this research (See Table 6-2), highlight the importance of building a mindset (whether its an MIS or Usability or something else) through involvement. There is a clear set of stages in involvement to establish a mindset. This research also highlights that involvement can enhance understanding of a concept. Where Swanson (1974) looks at MIS usage and understanding through involvement, this thesis looks to improve usability understanding and usability activities performance through involvement.

Involvement Concept	Involvement and Mindset (as discussed in Section 5.2.7)
Cooperative	Level 1 - Usability Value
Priori	Level 2 - Create Project Shared Vision
Appreciation	Level 2 - Create Project Shared Vision
Inquiry	Level 3 –Integrated Usability Mindset

Table 6-2: Swanson's (1974) involvement Concept compared

Gaining Involvement with usability understanding was alluded to by Billingsley (1995) when she describes 'Support and Incentive for Developer Involvement' recognising the importance of educating developers in usability understanding. This highlights the with 'Fostering project stakeholder relationships to maintain involvement' and 'Fostering project stakeholder relationships to establish a project usability vision' relationship found in the collaborative approach theme. This research highlighted the fostering through an incentives scheme to gain developer involvement and tried to establish usability understanding to create a usability vision.

In general, there was not any specific literature that discussed many of the relationships, between themes and concepts, which have emerged in this thesis, other than the three discussed. This thesis looks to contribute a clear understanding of the importance of involvement to development of a usability mindset. This has been discussed as a hierarchy of usability mindset engagement in Section 5.2.7.

6.6. Usability Maturity Models

Many of the usability capability maturity (UCM) models focus on key usability activities, throughout a project lifecycle, to assess in relation to level of maturity. This process orientation was found in many of the UCM models reviewed by Jokela et al. (2006). The most comprehensive usability processes used by a model, i.e. HFIPRA, has been used here to compare against the concepts that have emerged in this thesis.

The UCM discussed by Sherwood Jones et al. (2001), called HFIPRA, describes twenty-four processes to be measured in a usability capability assessment. The processes highlight some key aspects of usability practice to be considered that has been compared to the theory described in this thesis. Discussion on UCMs can be found in the literature review (Section2.5.4) and the summary of the processes in this UCM model in Table 2-18 in the literature review chapter.

The HS.1 processes focuses on lifecycle involvement, describes involvement by project stakeholders from beginning to end of a project lifecycle. This group of processes looks at examination of issues during conception, development, production, organization, support and retirement. Table 6-3 looks at the various processes within this section and how they relate to the concepts emerging in this thesis. It shows all process except one are broadly covered.

Processes	Link	Related concept
HS.1.1	✓	The need for a user focus, which includes primary users that are evolving, organizational stakeholders, legal and marketing stakeholders, and future users, i.e. concept "Involvement by all project stakeholders enhances the collaborative approach".
HS.1.2	✓	These user requirements need to be highlighted during each phase of the project lifecycle. This is discussed in many of the collaborative theme concepts.
HS.1.3	✓	The fostering and maintaining of relationships between the IS project team, user and organizational stakeholders is important, i.e. concept "Project stakeholder relationships must be fostered".
HS.1.4	✓	The continual monitoring, measurement and support of users, allowing for data to be collected that can support the evolving needs of the users. Generation of usability data to support the needs of users is an important part of usability activity performance, i.e. concept "Measuring usability goals".
HS.1.5	×	The needs of the users in a smooth transition when the IS is decommissioned. This idea has not emerged in this thesis.

Table 6-3: HFIPRA usability maturity process HS.1 involvement in the project lifecycle.

The H.2 processes look to the integration of usability activities throughout a project lifecycle. Table 6-4 looks to surmise the comparison with the emerging concepts in this thesis, it shows that the concepts do provide a broad coverage of all the processes in this section.

Processes	Link	Related concept that emerged from this thesis
HS.2.1	✓	Incorporating organisational goals into the project lifecycle is discussed in the concept 'Senior organisational stakeholder involvement' through their involvement and considered in the 'Organisational constraints external to project'.
HS.2.2	✓	Establish, promote and maintain performance of usability activities throughout the project lifecycle, covered in the concept 'Usability activities compliance within a project lifecycle' which focused more on maintaining performance.
HS.2.3	✓	Looking to allow usability resourcing to be considered in the project plan. This aspect has emerged as project constraints that have impacted on usability performance, i.e. 'Allocating resources to usability activities', 'Technological constraints', and 'When usability is initiated'.
HS.2.4	✓	The management of the usability resources needed for a project, throughout a project lifecycle, with consideration for various project constraints. Various constraints, as discussed previously have been again highlighted here along with maintaining usability throughout a project lifecycle, i.e. concept 'Usability activities compliance within a project lifecycle'.
HS.2.5	✓	Consideration of project risk in the utilisation of usability resources and performance of usability activities, this compares well with the concept 'Constraints dictate usability activity selection & performance'. This process looks to other concepts within the project constraints theme that impact on usability activity performance within a project lifecycle.
HS.2.6	✓	This process highlights the need for user involvement to improve the performance of the IS, user involvement is a key concept that has emerged in this thesis, i.e. 'Involvement by all

		project stakeholders enhances the collaborative approach', but this thesis has highlighted more than just primary user involvement.
HS.2.7	✓	Looking to communicate the usability findings to the various project stakeholders in the best way possible, in order for usability to have an impact on the project. The only concept that focused on relationships between the usability practitioner and other project stakeholders is 'Project stakeholder relationships must be fostered' concept. This process focuses on describing this relationship from a reporting requirement perspective rather than on a personal level.
HS.2.8	✓	Re-use of usability findings throughout the project lifecycle through the use of various management strategies, policies and documentation. This thesis has highlighted this in the following concepts: 'Usability maturity requires transformation of the organisational culture' and 'Project decisions embrace a usability mindset'. This process looks to enculturate usability through management and documentation compliance.

Table 6-4: HFIPRA usability maturity process HS.2 integrating of usability activities with a project lifecycle.

The HS.3 section looks to the appropriate usability activities being performed and the usability findings being considered throughout the project lifecycle, to ensure a beneficial usability outcome. Table 6-5 looks to summarise this comparison.

Processes	Link	Related concept that emerged from this thesis
HS.3.1	✓	Various characteristics of the 'context of use' and 'user requirements', respectively, need to be elicited. That includes the defining the users, their tasks, the technological constraints, the organisational and the physical environment of the IS. This is an important aspect that has emerged in this thesis within the concept 'Create and follow the usability requirements'.
HS.3.2		
HS.3.3	✓	The producing of design solutions and performance of evaluation techniques was not something that has emerged as a specific concept in this thesis. These processes and techniques were combined under the term usability activities in this thesis. This UCM model looks to the performance of these usability activities as a way of producing usability findings. This thesis looked beyond this by highlighting the need for involvement in usability activities to help develop the usability mindset, i.e. 'Usability activities involvement enhances usability mindset', and compliance in performing usability activities during a project lifecycle, i.e. 'Usability activities compliance within a project lifecycle'. The consideration of project constraints when looking to select and perform usability activities, i.e. 'Constraints dictate usability activity selection & performance'. The other emerging concept was the importance of the 'Skillset and experience of usability practitioner' in performing the usability activity.
HS.3.4		

Table 6-5: HFIPRA usability maturity process HS.3 effective usage of usability findings across the project lifecycle

The HS.4 looks to the management and effective performance of usability activities by engaging the appropriate set of stakeholders to be involved. Table 6-6describes the comparison with the concepts emerging from this thesis, to show that many of the processes in this section did not emerge from this thesis.

Processes	Link	Related concept that emerged from this thesis
HS.4.1	✓	To properly resource a project with people with the right skillsets, the right equipment, the appropriate training and delivery strategies. This will enable these project stakeholders to work together to achieve the usability goals of the project. This thesis has highlighted the need for employing the appropriate skillset, especially from a usability practitioner perspective. It has also highlighted the importance of working in a team, i.e. 'Usability team practices'. This UCM process has alluded to the creation of a shared vision to work towards by the project stakeholders, i.e. 'Establish a shared usability vision using collaboration'.
HS.4.2	×	Looks to the project lifecycle and the provision of the appropriate skillsets needed for the entire lifecycle. If gaps arise, look to mitigate these resourcing issues. The interviewees discussed this as a problem, when key personnel changes occurred in a project team. This process highlights the need to mitigate this issue, but it has not emerged as a concept in this thesis.
HS.4.3	×	This process looks at the ongoing maintenance of the IS, which has not emerged in this thesis as a concept.
HS.4.4	×	Improving deployment activities, from a usability perspective, such as training materials and shortfalls in usability. Only discussed by usability practitioners interviewed when techno logical constraints did not allow design changes, leaving the only alternative was to mitigate usability issues through training materials and user guide documentation. This did not emerge as a key concept in this thesis.

Table 6-6: HFIPRA usability maturity process HS.4 management and effective performance of usability activities

The previous comparisons discuss the various processes which have intersected with concepts that have emerged in this thesis. There was a good coverage of concepts across the four themes, with coverage of the key themes of involvement, usability practice and project constraints.

The processes in this UCM model did not cover much of the usability mindset theme. The reuse of usability data across the project lifecycle (HS.2.8) and the performance of usability activities to achieve the usability goals (HS.4.1), provided the only process that alluded to the development of a shared usability vision by utilising usability findings across the project. Also, the articulation of the characteristics of context of use and user requirements looked to create the usability requirements (discussed in HS.3.1 and HS.3.2), which is part of the usability mindset theme.

The processes in this UCM model discussed aspects that have not emerged as concepts in this thesis. These include the transition required when an IS is ceased (discussed in HS.1.5) and aspects to deployment, staff resourcing, ongoing support and maintenance (discussed in HS.4.2, HS.4.3 and HS.4.4). These aspects would not have been discussed by the usability practitioner interviewed, since the questions asked were more focused on the usability outcomes of an engagement in a project, which provided a perceived limitation to the discussions.

The experience gained through the performance of usability activities within a project and across an organisation can be used to improve the usability maturity of an organisation (Al-Qaimari 2005). The concept of experience provides an interesting concept to incorporate into a UCM model. Learning from the past usability experience can improve future usability engagement.

The experience of a usability practitioner has been identified, in this thesis, as an important factor in achieving beneficial usability outcomes for projects, i.e. concept ‘Skillset and experience of usability practitioner’.

6.7. Discussion Summary

This chapter has contrasted the emerging themes and concepts from this thesis with the literature, predominantly the usability literature, along with the usability capability maturity models (Section 6.6).

Many concepts from this thesis were found to have a good coverage in the literature. The literature did have varying degrees of coverage against the concepts. An example of this is the concept of involvement and collaboration between project stakeholders, where this thesis has highlighted the need for involvement the literature has corroborated many of these. They differ in two ways, firstly the literature covers the concept of involvement in detail, such as looking at the engagement in terms of type and degree of participation as discussed by Barki and Hartwick(1989), Franz and Robey(1986) and Ives and Olson (1984). This thesis has not provided fine detail on the various factors of involvement (see Table 2-7 in literature review). Secondly, the emerging concepts and relationships in this thesis have highlighted the development of a usability mindset is best obtained through involvement, which provides involvement with a new factor: an opportunity to improve usability value, shared usability vision and usability mindset of all project stakeholders, as discussed in the analysis chapter (Chapter 5) and in particular the key relationship discussed in Section 5.2.7.

This one study(Robertson, T 2004; Robertson, T & Hewlett 2004; Robertson, TJ et al. 2003) compares the most favourably to the emerging concepts and themes of this thesis. There were thirteen concepts that have been discussed. The study highlighted user advocacy as distinctly important, which in this thesis was incorporated as a minor aspect to the main stakeholder involvement concept. All four themes were covered by this study. But the key relationship between collaborative theme and usability mindset theme was not discussed; it may have emerged, with further analysis performed on the data if the study had not ceased.

There are various aspects of the literature that have not emerged in this thesis, that have been discussed in this chapter. In summary these include:

- Aspects of usability consideration after completion of a project during maintenance, enhancement and cessation of IS, especially considering the evolving nature of users (discussed predominantly as processes to assess as part of UCM model).Ongoing maintenance of IS and continued focus on usability and consideration for usability in the deployment activities of a project, continues to impact on the usability outcome.
- Usability practitioner effects on the performance of usability activities have been covered in the literature but did not emerge from this thesis study, since usability practitioner do not often have an opportunity to reflect on their usability practice.
- Management of project stakeholder when engaged in usability activities has emerged as a concept but has not been enfolded with literature comparison in this chapter.
- Establishing usability activities or integration of usability activities in a project lifecycle was not directly emerged in this thesis, only compliance in a project lifecycle.

A couple of the concepts that have emerged from this thesis are similar to the literature:

- A concrete skillset as specified by Dayton (1993), did not emerge from this thesis, but a significant set of skills have been covered, that are key skills to improve the usability outcome.
- Personnel issues (like loss of key project stakeholders), during a project, have not emerged as a key concept in this thesis. They have been mentioned in passing by a small number of interviewed usability practitioners, as something that does impact on the usability outcome.
- The distinct difference of senior management support/sponsorship or active participation was not made in this thesis, only that their active involvement is preferred, in order to improve usability outcomes.

In Table 6-7 each of the concepts and inter-theme relationships have been shown. It highlights the fact that most of the concepts are well supported by the literature. A number of concepts do not go into the same level of detail as the literature therefore there are gaps, which is expected based on the scope of the research done. A number of concepts are not covered by the literature and vice versa.

The key focus of this thesis is improving usability outcomes for a project that has resulted in the major finding being the HUMCA hierarchy discussed in Section 5.2.7. This key contribution to the usability literature has not been specifically discussed or addressed in the usability literature.

Theme	Concept	Not covered	Supported	Concept Gaps
Collaborative Approach	Establish a shared usability vision using collaboration		✓	
	Involvement by all project stakeholders enhances the collaborative approach		✓	
	Crucial involvement by IS project team members		✓	
	Senior organisational stakeholder involvement		✓	✓
	Project stakeholder relationships must be fostered		✓	
Usability Mindset	Create and follow the usability requirements		✓	
	Nurture usability understanding		✓	
	Making usability real to create a shared vision for project stakeholders	✓		
	Project decisions embrace a usability mindset		✓	
	Usability goals promote a usability mindset		✓	
	Usability maturity requires transformation of the organisational culture		✓	
	Usability activities involvement enhances usability mindset		✓	
Project Constraints	Usability activities compliance within a project lifecycle			✓
	Constraints dictate usability activity selection & performance		✓	
	Technological constraints		✓	
	Allocating resources to usability activities		✓	
	Organisational constraints external to project		✓	
	When usability is initiated		✓	
Usability Practice	Demonstrate value in engaging usability practitioners			✓
	Measuring usability goals		✓	
	Maintain flexibility with usability practice		✓	
	Managing stakeholder involvement		✓	
	Evangelising usability to project stakeholders		✓	
	Skillset and experience of usability practitioner			✓
	Validation of usability practice		✓	
	Usability team practices		✓	
	Usability education of project stakeholders		✓	
Inter theme relationships	Usability mindset prevails beyond the project context	✓		
	Shared usability vision by all project stakeholders	✓		
	Project constraints discovered and concorded through involvement	✓		
	Project constraints impact on usability goals	✓		
	Articulating and concording usability goals is core to project usability mindset	✓		
	Managing stakeholder involvement in usability activities	✓		
Internal theme relationships	Making usability goals real in project improves usability mindset	✓		
	Usability Activity involvement makes it real and nurtures usability understanding	✓		
	Skillset, experience and team environments	✓		
	Fostering project stakeholder relationships to maintain involvement		✓	
	Fostering project stakeholder relationships to establish a project usability vision		✓	
	Project constraints impact on the selection and performance of usability activities	✓		
Other research	Maintenance and deployment usability issues	✓		
	Establishing and/or integrating usability activities into development process	✓		
	Usability personnel issues	✓		
	Evaluator effect on performance of usability activities	✓		

Table 6-7: summary of coverage, support and gaps of the concepts, relationships and other literature

In this enfolding chapter, the various concepts and themes that have emerged and have contributed to this key finding have been shownto have a good grounding in the literature. The set of concepts in the collaborative them have been well established in the involvement literature. The set of concepts in the usability mindset theme have also obtained a good grounding in the literature. The relationship between these two themes is the key finding in this thesis.

The strong relationship between usability mindset and collaborative approach theme (discussed in Section 5.2.7) that has emerged in this thesis provides an important contribution to the usability area. The usability research area has underpinned the various concepts that have emerged in this thesis, but this thesis has gone further by showing a strong relationship between core themes. It reinforces within the usability education, usability research area and usability practice areas, that to have a successful usability outcome you must aspire to achieve a good collaborative approach and a high level of usability understanding. It is only through a collaborative approach that a usability mindset can be improved, or conversely a usability mindset can be shaped by a collaborative approach. These themes go hand-in-hand. One without the other reduces the usability outcomes attainable.

CHAPTER 7

7. Conclusion and Future Research

This chapter will provide the conclusions of this research, where a theory has been presented that emerged from the analysis (based on the interview data in Chapter 4) discussed in Chapter 5 and the related findings from the enfolding of literature in Chapter 6. As described in the methodology chapter (Chapter 3), the story told by this research will conclude with a theory that answers the research question.

The main aim of this chapter is to provide a summation of the theory that has emerged from the data analysed. It is an accumulation of the analysis performed and literature enfolded to generate a theory that will answer the research question and sub-questions. This will lead to the key contribution of this research to be articulated and discussed in light of other key areas that this theory will have implications on.

This conclusion chapter will firstly, look to provide the essence of the theory generated; secondly, look to the key contribution to knowledge that this theory provides; thirdly, it will examine the implication of this research on the literature, industry usability practice, usability education and the discipline of information systems; fourthly, a discussion on the limitations of this research. Lastly, suggestions of future research that can build and follow on from the theory presented in this research.

7.1. Introduction

The key finding for this research is that a ‘usability mindset’ must be developed in key project stakeholders, through a ‘collaborative approach’ that highlights involvement in usability activities in order to achieve a beneficial usability outcome. It is not enough simply to

involveproject stakeholders in usability activities to discover usability issues. It is not enough for project stakeholders to understand the value of usability. It is preferred to either develop a shared usability vision for a project or enhance the usability mindset for the project and beyond to other projects and across to the organisational culture. This is best done through making usability issues real when engaged (involved, observing, and/or presented) in usability activities.

The usability mindset is not a static definition of usability requirements for a project. It is shaped and moulded through involvement and input by all project stakeholders throughout a project lifecycle. A usability practitioner's role is to educate, mentor, evangelise, sell and/or involve project stakeholders in the concept of usability for the project. The nurturing of usability understanding will drive the usability mindset for the project during usability activities. Ultimately, this will improve the usability maturity of a project team and/or organisation, which will routinise the involvement and development of usability mindset that will inform decision-making.

A project stakeholder's role is to be involved, gain an understanding of usability mindset (at least a shared usability vision for project), and provide their expertise and/or knowledge to enhance the project usability mindset and the project constraints. A usability practitioner's role is to facilitate project stakeholder involvement, perform usability activities, analyse usability findings and make recommendations. The role of usability and usability activities is to provide the platform from which a usable IS is developed that supports a range of stakeholders to perform a set of tasks in a given environment or context.

7.2. Essence of research

The essence of this research is highlighted by the four major themes that have emerged from the analysis of the data. This essentially provides the answer to the research question. The theory generated by this research is based on these four major themes (discussed in Section 5.1):

- **Usability mindset** is articulated in the usability requirements for a project and includes a set of usability goals. This usability mindset develops through engagement (education, selling, promoting or evangelising, for example) with project stakeholders or through involvement in usability activities. The involvement is preferred since it provides authenticity to the usability problem domain. Ultimately a usability mindset improves project and organisational decision-making.

- **Collaborative approach** looks to engage project stakeholders by involving them in usability activities. This involvement may be as an active participant (which is preferred), observational capacity or listening to a presentation (or report) of the usability issues. It is crucial to have both IS project team members and senior organisational managers involved. Continued involvement requires fostering of relationships with project stakeholders. Involvement is required to establish the project shared usability vision and ultimately the usability mindset.
- **Usability practice** describes two aspects of a usability practitioner's involvement in a project. Firstly, they facilitate the various forms of engagement and involvement with usability activities, evangelising usability, managing and fostering relationships with project stakeholders, measuring usability goals, eliciting and concording project constraints. Secondly, their skillset, expertise and experience working in a usability team of two or more and flexibility in performance of usability activities will impact on the quality of the usability practice.
- **Project constraints** highlight various limitations across project elements. In order to consider the impact of project constraints on usability activities, constraints must be elicited from and through the involvement of project stakeholders. The major constraints highlighted included: Time given, budgetary constraints, technological constraints, late engagement of usability during a project lifecycle, inflexibility in usability activity performance, non compliance in project lifecycle processes, organisational constraints and lack of stakeholder involvement. Another constraint that may occur is tension between the set of project constraints and the usability goals that conflict or competes and therefore requires concordance or prioritising.

The various elements of this theory are discussed in detail in Chapter 5. The key elements are the four themes and the significant relationships between the themes (shown in Figure 7-1). The key relationships are the two strong relationships between the collaborative approach theme and the usability mindset theme. This theory highlights the crucial importance for involvement and development of a usability mindset to be symbiotically related in order to achieve a beneficial usability outcome. There are elements of usability practice that have an impact, along with consideration for project constraints that have an impact on both the collaborative approach and usability mindset themes. The twenty-seven concepts (which define the four themes) are illustrated in Figure 5-3 (fishbone) and discussed in Sections 4.2, 4.4, 4.5 and 4.6. The six significant relationships, between themes, are discussed in Section 5.2.

As discussed, the major relationship of this theory is between the usability mindset and collaborative approach themes. When examined closely, this symbiotic relationship describes a hierarchy of engagement to improve usability understanding (discussed in detail in Section 5.2.7) and hence lead to an improved usability outcome:

- Level 0: None or incidental usability performance,
- Level 1: Usability value understood and seek out usability performance,
- Level 2: Shared usability vision for project developed, and
- Level 3: Usability mindset inherent in project and organisational decision-making.

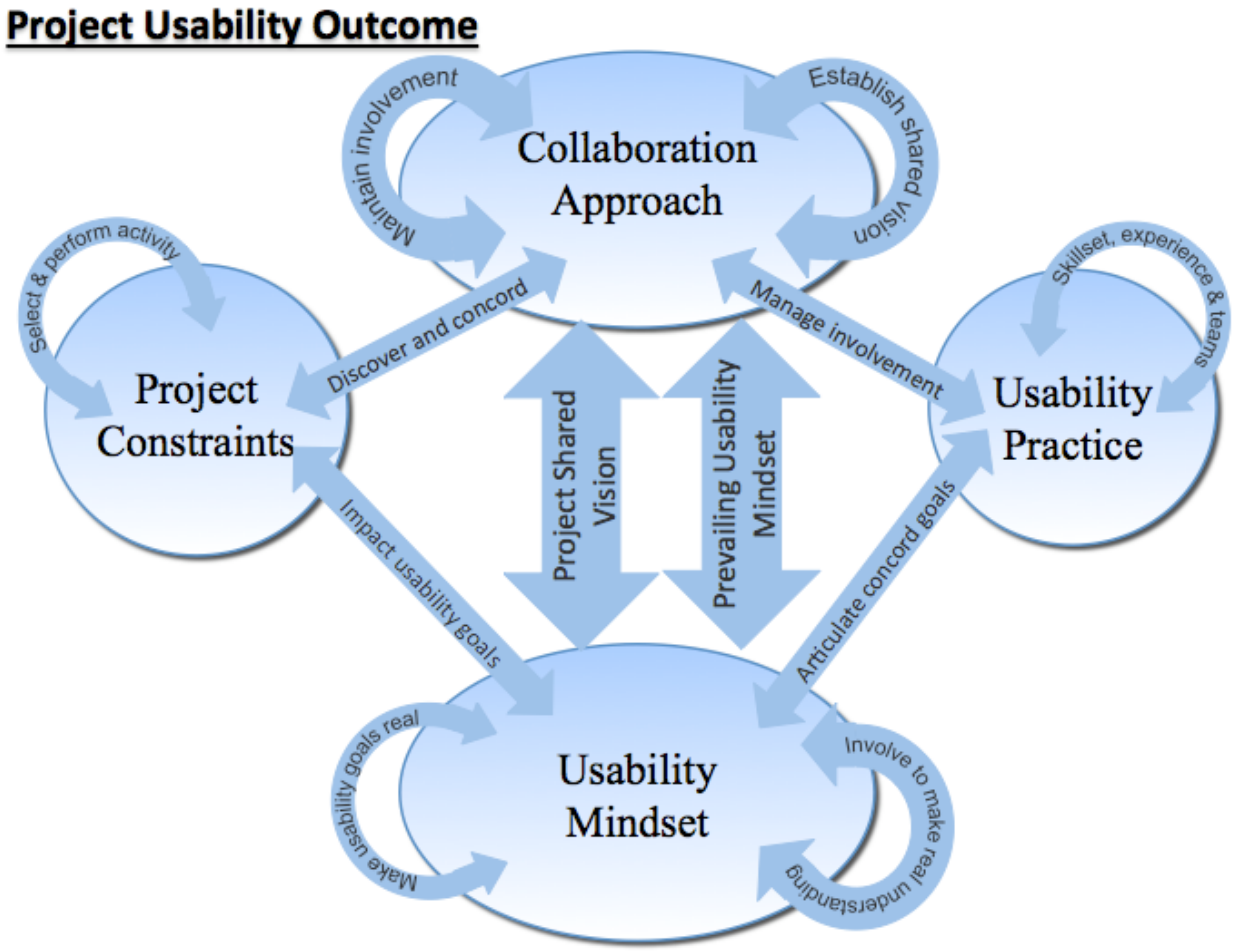

Figure 7-1: Key themes and relationships that impact on the usability outcome of a project

This hierarchy of usability understanding through engagement has emerged from a number of relationships between concepts between two themes. The two strong relationship concepts (discussed in Section 5.2.1 and 5.2.2) that have created this strong bond between the usability mindset and collaborative approach themes are:

- Usability mindset prevails beyond the project context
- Shared usability vision by all project stakeholders

Other key relationships between themes include the management of involvement (collaborative approach) as part of usability practice. The usability practice of eliciting, articulating and concording of usability goals defines the basis for the usability mindset for a project. The project constraints impacts on and shapes the usability mindset. The discovery of project constraints are best elicited through project stakeholder involvement, i.e. the collaborative approach.

Usability consultants may find it hard to have a strong impact on the relationship between the collaborative approach and usability mindset themes. It is often harder to change things when engaged late in a process, when not present throughout a project lifecycle to have appropriate conversations to build usability mindset, when the time given and budgetary costs are dictated by project plans and involvement is harder to attain (discussed in more detail in Section 5.3.3).

The usability manager is more focused on the skillset of usability practitioners, looking to education or mentoring to improve skillset. They also have a greater focus on allocation of usability resources to a project, with a focus on skillset and experience dictating allocation. Usability managers had more of an impact on the usability practice theme (discussed in more detail in Section 5.3.2) than other usability practitioners.

In essence the theory described, at a broad level, is the four key themes and the relationships between them that will support a beneficial, rather than detrimental, impact on the usability outcome of a project. The more concrete list of concepts provides a set of specific concepts that should be considered as part of a project engaging usability that will be effective. Section 5.5 discusses a shortened list of concepts that are more important to consider, since twenty-seven concepts is an onerous number to keep in front of mind during a project lifecycle. The key concepts that can be used as guidelines for practice include:

- Project stakeholder relationships must be fostered
- Involvement by all project stakeholders enhances the collaborative approach
- Making usability real to create a shared vision for project stakeholders

- Crucial involvement by IS project team members
- Usability goals promote a usability mindset
- Organisational constraints external to project
- Nurture usability understanding
- Usability maturity requires transformation of the organisational culture

This theory's contribution to knowledge is not the twenty-seven concepts that have emerged, because these (in the main) have been corroborated with the current literature (as described in Chapter 6). The major contribution to knowledge is the key relationship concepts that exist among the themes. The most important of these being the relationship between the usability mindset and collaborative approach themes discussed earlier, which is supported by two strong relationships and a hierarchy of usability understanding through engagement.

7.2.1. Research Questions

This section will answer the research question in light of the theory generated by this research, which was summarised in the previous section. The research sub-questions, as discussed in Section 3.1, will also discussed. The main research question is:

> ***What issues impact the usability outcome of a project, as perceived by usability practitioners?***

The key issues that impact on the usability outcome for a project, as perceived by usability practitioners, are five fold. Firstly, all project stakeholders are required to collaborate in usability activities, especially IS project team members and senior organisational managers. Secondly, project stakeholders need to develop a project usability mindset and also contribute their own expertise to the usability mindset. Thirdly, what project constraints have been identified and have been concorded into the usability mindset. Fourthly, the consideration required for usability practice to facilitate collaboration, development of usability mindset and consideration of project constraints. Lastly, the combination of a collaboration approach and usability mindset provides the project stakeholders the usability understanding through engagement to make better usability decisions that lead to improved usability outcomes.

This highlights the four themes presented in the theory and a crucial relationship. The concepts within each theme provide more details on what is important in having a more beneficial usability outcome. The Section 5.5 describing the guidelines in practice provides a more concrete level discussion on the concepts that have a beneficial or detrimental affect on the usability outcome for a project.

What should be the role of usability practitioners in a project?

A usability practitioner's key role is to facilitate the project stakeholder involvement. The involvement is not simply to gain participation from project stakeholders in usability activities to generate usability findings, but also to elicit goals and constraints based on project stakeholder domain knowledge. Usability practitioners can also provide their usability expertise and sometimes be user advocates in a project. They may be required to educate, mentor or promote usability to project stakeholders to enable the development of a usability mindset. Usability practitioners need to be adhocratical[22] in nature, because they need to go across organisational boundaries in order to elicit usability goals, project constraints and foster relationships for ongoing involvement. The functional aspect of their role is the performance of usability activities to help facilitate the other aspects of their role.

How should project stakeholders engage with usability in a project?

Project stakeholders' engagement in usability activities in a project is not limited to simple participation for the usability practitioners to elicit usability findings. This involvement needs to go further. Project stakeholders need to be able to develop, at a minimum, a shared project usability vision. Project stakeholders can provide the domain expertise to contribute to the project constraints and usability mindset. While this is best done through involvement in usability activities by participation, it can also be achieved to a lesser degree through observation, or listening to a presentation (or report) of usability findings. The development of a

[22] Being adhocratical is using a very simple structure or lack of structure; opposite of bureaucracy. An adhocracy is devoid of rules and regulations, a hierarchy, or standard procedures for problem-solving; rather, it is flexible and responsive.

usability mindset can be achieved through this involvement or through more direct means such aseducation, mentoring, or promotional (evangelising or selling) activities.

7.3. Implications of this research

This section will examine the implications of theory generated in this research to the usability research area, the practice of usability in industry, the educational context and the discipline of IS.

7.3.1. Usability Research

The theory presented in this thesis provides the literature a theory grounded in industry practice to utilise in future usability research. The theory comparison, done in Chapter 6, compares many of the key concepts and themes highlighted in this theory against theory found in the usability literature. Even though there are unique findings in this theory, the major parts of the theory have been discussed in various ways and with various perspectives in the literature. This theory provides a unique grouping of themes and concepts that, when combined, defines a comprehensive theory that broadly covers the key aspects that impact on the usability outcome of a project. The most important aspect of the theory is the relationship between these concepts providing a unique insight into the key concepts that together can lead to a more beneficial usability outcome.

This theory can enable academics to consider the broad conceptual perspective of what is important for a beneficial usability outcome. This will enable them to place their own research work alongside this theory to gain a greater understanding of how it fits. It may highlight gaps or consideration, not identified in their own work, or conversely highlights gaps in this theory. It also highlights the importance of looking to relationships between concepts providing a better understanding of a phenomenon, rather than a simple focus on the practice of applying the usability activities. There needs to be less emphasis on individual practices, which is a second order issue, and more focus on improving understanding of usability for a given project through involvement. Utilising this involvement to nurture usability understanding, can improve usability mindset for project and increase the usability maturity of an organisation. The traditional outputs of usability activities are still important but not the sole purpose of performing them.

The conceptual nature of this theory means that it can be used across a number of usability research areas, which can include:

- Introduction of usability into an organisation,
- Usability cost-benefit analysis,
- Usability maturity models,
- Usability procurement agreements, and
- Focus on participatory nature of usability activities.

7.3.2. Usability Industry Practice

The broad picture provided by the theory can allow usability practitioners to reflect on their own practice. This enables them to digest a reflective piece of work that is derived from their practice and provide direction on what concepts or ideas may have greater impact in practice. The highlighting of key concepts, as discussed in Section 5.5, provides guidance for usability practice.

The summary of the key concepts to focus on for a beneficial usability outcome are shown in Table 5-9 in Section 5.5.1, and the detrimental list of concepts are shown in Table 5-10 in Section 5.5.2. In addition, the usability practitioner demographics can have an impact on the usability outcome achievable, the comparative analysis and results are shown in Table 5-5, Table 5-6, Table 5-7 in Section 5.3. This shows that organisational-based usability practitioners have a great opportunity to apply this theory and achieve a good usability outcome.

The combination of beneficial, detrimental and consultant vs. organisational guidelines for practice, taken from Section 5.5, have been merged into a generic list of concepts. Table 7-1 shows this generic concept list which was based on concepts mentioned in two or more of the lists discussed.

Usability Industry Practice concepts
Usability goals promote a usability mindset
Involvement by all project stakeholders enhances the collaborative approach
Organisational constraints external to project
Project stakeholder relationships must be fostered
Usability maturity requires transformation of the organisational culture
Making usability real to create a shared vision for project stakeholders
Nurture usability understanding
Crucial involvement by IS project team members

Table 7-1: Combined list of important concepts to consider for industry practice

This research has highlighted that the performance of usability activities alone is a secondary level issue. It is attaining involvement through usability activities that can lead to usability understanding for an IS project, its project stakeholders and the usability practitioners. This leads to the improvement of usability maturity across an organisation.

7.3.3. Usability Education

The education of IS professionals, mainly done through university undergraduate programs and a number of postgraduate programs, can benefit from this theory. The understanding of the various aspects of an IS project,and their implications from a usability perspective, can enhance the usability mindset. The importance of collaboration, the provision of skills to help foster relationships and the maintenance of relationships to enhance involvement and further develop the usability mindset, are key concepts of this theory.

A usability educational program should consider the following key concepts in order to improve usability outcomes for projects:

- Create and follow the usability requirements
- Involvement by all project stakeholders enhances the collaborative approach
- Project stakeholder relationships must be fostered
- Usability activities involvement enhances usability mindset
- Organisational constraints external to project
- Allocating resources to usability activities

- Technological constraints
- Measuring usability goals
- Maintain flexibility with usability practice
- Skillset and experience of usability practitioner

The nature of project stakeholder involvement and the development of a usability mindset for project stakeholders should be dominant themes that are discussed across the various concept topics above.

7.3.4. Discipline of Information Systems

The IS discipline is grounded in the development ofIS business problems. The effective solving of a business problem requires consideration of usability. This theory provides the IS discipline with an important set of concepts and relationships between concepts to be considered, throughout a project lifecycle that will allow for a more beneficial usability outcome to be reached.

7.4. Limitations of the Research

This research has a variety of limitations that need to be considered when looking to adopt the theory generated. These include:

- The theory generated was based solely on the perspective of usability practitioners. This does not consider the perspective of the other project stakeholders (Stakeholder groups discussed in Section 4.2).
- The study has been performed in Australia, with usability practitioners who have worked in Australia, which may not be indicative of the usability industry in other countries. Research has shown that stakeholders ‘understand usability differently depending on their cultural background’(Frandsen-Thorlacius et al. 2009).
- The study interviewed only twenty-one usability practitioners, although theoretical saturation was reached based on this set of usability practitioners. There may have been other concepts highlighted if more usability practitioners had been interviewed.

- The detail in the interview data did not allow a finer level of analysis to be made in some of the concepts that have emerged. For example, this study did not reveal a comprehensive skillset required of usability practitioners, but some required skills were discussed by practitioners interviewed. These points of detail have been highlighted in the enfolding chapter (Chapter 6).

7.5. Suggestions for Future Research

During the iterative analysis of the interview transcripts, other interesting aspects were discovered. These other aspects did not relate directly to be the research question, so it was decided that they were beyond the scope of this research, but it has generated ideas for taking this research further.

- Testing the theory via the creation of a survey to gauge the importance placed on the key themes of this research across a large cross-section of the usability practitioner community.
- Examine the various levels at which usability is evangelised within a project. Preliminary data shows that usability is evangelised at an organisational level to improve maturity. It highlights usability evangelism of all project stakeholders. Finally, it can be focussed on evangelising the individual usability activities performed in a project lifecycle.
- Closer studies of the roles of a usability consultant and how it differs from a usability practitioner based within an organisation.
- Further development of the usability maturity model to highlight the various stages of project stakeholder and organisational usability mindsets. This could be linked to the level and type of involvement and examined in relation to project decision-making.
- Deeper examination of the required skillset of a usability practitioner based on the theory generated by this research supplemented with literature and further usability practitioner data collection.
- Look to interview or survey other project stakeholders (discussed in Section 4.2), impacted by usability in a project, to gauge the validity of this theory based on perceptions of other stakeholders involved in a project.
- Use of the theory in curriculum development for usability at a usability level.

- Examining the impact of a usability practitioners experience level on the usability outcome of usability activities and impact on developing a usability mindset for a project and across the organisation.

7.6. Conclusion

This research has shown that usability outcomes for projects can be improved through increased stakeholder collaboration and development of usability mindsets in stakeholders and organisations. This requires fostering relationships, providing opportunities for involvement that improve the project shared vision, and making usability real to all stakeholders (including senior organisational stakeholders and IS project team members). The project level usability mindset is developed in collaboration with all project stakeholders. The transferable usability mindset is obtained through active collaboration and contribution of all stakeholders involved in a project. This stakeholder collaboration and development of a usability mindset needs to be obtained while consideration is made to the various project constraints and usability practices. This phenomenon has been observed and grounded in the practices of usability practitioners. This highlights that usability outcomes are not related to any particular usability activity or usability process, but to the level of value, involvement and understanding established in the concept of usability by all project stakeholders. Ongoing promotion of stakeholder collaboration and building of a usability mindset will significantly and continually improve usability outcomes attainable in current and future IS projects.

Appendix A – Ethics Consent Form

RMIT HUMAN RESEARCH ETHICS COMMITTEE

Prescribed Consent Form for Persons Participating In Research Projects Involving Interviews, Questionnaires, Focus Groups or Disclosure of Personal Information

PORTFOLIO OF **Business**

SCHOOL/CENTRE OF **Business Information Technology**

Name of Participant:

Project Title: **Assisting novice ICT professionals to perform usability analysis of web applications**

Name(s) of Investigators: (1) **Vince Bruno** Phone: **(03) 9925 5784**

(2) **Dr Martin Dick** Phone: **(03) 9925 5976**

1. I have received a statement explaining the interview/questionnaire involved in this project.
2. I consent to participate in the above project, the particulars of which - including details of the interviews or questionnaires - have been explained to me.
3. I authorise the investigator or his or her assistant to interview me or administer a questionnaire.
4. I give my permission to be audio taped: ☐ Yes ☐ No
5. I acknowledge that:

(a) Having read the Plain Language Statement, I agree to the general purpose, methods and demands of the study.
(b) I have been informed that my identity will not be revealed by this research.
(c) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied.
(d) The project is for the purpose of research and/or teaching. It may not be of direct benefit to me.
(e) The privacy of the information I provide will be safeguarded. However should information of a private nature need to be disclosed for moral, clinical or legal reasons, I will be given an opportunity to negotiate the terms of this disclosure.
(f) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to participants on request. Any information which may be used to identify me will not be used unless I have given my permission (see point 5).

Participant's Consent

Name: _____ Date: _____
(Participant)

Name: _____ Date: _____
(Witness to signature)

Participants should be given a photocopy of this consent form after it has been signed.

Any complaints about your participation in this project may be directed to the Chair, Portfolio Human Research Ethics Sub-Committee, Business Portfolio, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 5594 or email address rdu@rmit.edu.au. Details of the complaints procedure are available from: www.rmit.edu.au/council/hrec.

Appendix B – Ethics Plain Language Statement

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School of Business
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Australia

Tel. +61 3 9925 5969
Fax +61 3 9925 5850
• www.rmit.edu.au

INVITATION TO PARTICIPATE IN A RESEARCH PROJECT
PROJECT INFORMATION STATEMENT

Project Title:
- Assisting novice ICT professionals to perform usability analysis of web applications

Investigators:
- Vince Bruno (Phd Student, Lecturer, School of BIT, RMIT University, vince.bruno@rmit.edu.au, 9925-5784)
- Dr Martin Dick (Supervisor, Lecturer, School of BIT, RMIT University, martin.dick@rmit.edu.au, 9925-5976)

Introduction
You are invited to participate in a research project being conducted by RMIT University in the School of Business Information Technology. This information sheet describes the project in straightforward language, or 'plain English'. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

Who is involved in this research project?
This research is being conducted as part of a PhD program which is being undertaken by Vince Bruno. This research project has been approved by the Portfolio Human Research Ethics Sub Committee. The proposal describing the PhD research and this methodology (interview) has been accepted by the Research and Development Unit in the Faculty of Business at RMIT University.

Why is it being conducted?
This project is attempting to elicit the experience and expertise of usability professionals in the conducting of usability activities in relation to the analysis, design, implementation and maintenance of an information system. The data elicited will then be used, together with current usability research obtained from the literature, to develop a usability framework that can be used to inform, teach and provide guidance to novice ICT professionals that need to perform similar activities in project that they are involved in.

Why have you been approached?
Participants of this research have been invited, through approaches to companies or through emailing Usability related mailing lists, to volunteer some time to discuss their profession and the usability activities performed.

What is the project about? What are the questions being addressed?
The underlying research question being answered is:

> *How can novice ICT professionals be assisted to produce good web usability designs?*

It is intended that the gathering on information about what is done in industry in relation to usability activities through interviewing of 20-30 usability professionals.

If I agree to participate, what will I be required to do?
Participants will be asked to participate in a semi-structured interview, for approximately 1 hour, where discussion will take place about the usability activities performed by the participant in their job. This will include describing usability activities performed in various projects that the participant has been involved in. This may include projects that have gone well or not so well.

This may include discussion of daily activities in supporting projects. This interview will be recorded (audio only) and you (the participant) have the right to request that recording cease at any stage during the interview.

What are the risks or disadvantages associated with participation?
There are no apparent risks in participating in this research, it involve discussion based on a professional level only. If you (the participant) are unduly concerned about your responses to any of the interview questions or discussions or if you find participation in the interview distressing, you should advise the interviewer, that you either want to strike that discussion from the record or discontinuing the interview. The researches will discuss your concerns with you confidentially and suggest appropriate follow-up, if necessary.

What are the benefits associated with participation?
Participation in this project will benefit the usability profession, providing incite into what it is that usability professionals do. For the participant the researchers can offer any results, papers, and other outcomes. This may also provide an avenue for future research partnerships between the participant (their organisation) and the university.

What will happen to the information I provide?
All recorded data will be transcribed and encrypted and archived. The transcribed data will be kept during the analysis phase of the research on the primary researcher's desktop computer and will be stored at RMIT in the School of Business information Technology. A USB storage device will be used to backup the encrypted data, and stored in a secure place (offsite at primary researcher's residence). All the data will be kept for 5 years upon completion of the project, at such time it will be destroyed.

If the data is required for some other purpose (other than use in this project), then permission will be obtained from the participants before use.

What are my rights as a participant?
You have the right to withdraw your participation at any time, without prejudice. You have the right to have any unprocessed data withdrawn and destroyed, provided it can be reliably identified and it does not increase the risk for the participant. Participant also have the right to have any questions, in relation to the project and their participation, answered at any time.

Whom should I contact if I have any questions?
The primary investigator (Vince Bruno – vince.bruno@rmit.edu.au or 03 99255784) or his supervisor (Dr. Martin Dick – martin.dick@rmit.edu.au or 03 99255976) should be contacted, contact details given previously.

Yours Sincerely

Vince Bruno	Dr. Martin Dick
Master of Computing (Info. Tech.)	Doctor of Philosophy in Computing

Any complaints about your participation in this project may be directed to the Secretary, Portfolio Human Research Ethics Sub Committee, Business Portfolio, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 5594 or email address rdu@rmit.edu.au. Details of the complaints procedure are available from the above address or http://ww.rmit.edu.au/council/hrec

Appendix C – Practitioner Attribute Summary

The following table (Table 7-2) shows the practitioners in the order in which they were interviewed, giving details about their education, predominant role (Usability [M]anager or Usability [P]ractitioner), number of concepts coded, total coded references and the length of the interview session.

#	Education	Role	Years of experience	Num of concepts	Total coded references	Length of Interview
01	Computer science (CS) – masters cognitive	M	16	49	141	47
02	Psychology	P	7	39	87	37
03	Commerce and art	P	5	34	98	29
04	Industrial and mechanical engineering + masters	M	10	30	67	41
05	Computer science (CS)	M	6	45	121	44
06	Commerce and art	M	7	29	52	31
07	Grad dip applied information systems	P	6	39	91	42
08	Arts – masters in ergonomics	M	15	44	177	65
09	Multimedia - masters in multimedia	P	5	32	58	46
10	Psychology	M	10	40	100	36
11	Graphic design	P	5	37	77	28
12	Accounting	M	22	27	45	55
13	Computer science – master CS - PhD	P	13	49	115	51*
14	Information systems	P	5	49	126	48
15	Industrial design	M	7	58	136	38
16	Psychology – master industrial psychology	M	12	68	230	77
17	Psychology – master of science	P	5	58	153	46
18	Multimedia design	P	5	60	166	43
19	Economics – master internet comm. – master HF	M	8	50	110	35
20	Commerce and information systems	P	5	53	158	39*
21	Science & art – master of psycho-analysis – PhD	P	10	67	258	64

Table 7-2: Other details of the interviewed usability practitioners

Appendix D – Concept Comparisons

Concept Comparison: Sources	Establish a shared usability vision using collaboration	Involvement by all project stakeholders enhances the collaborative approach	Crucial involvement by IS project team members	Senior organisational stakeholder involvement	Project stakeholder relationships must be fostered	Usability activities compliance within a project lifecycle	Constraints dictate usability activity selection & performance	Technological constraints	Allocating resources to usability activities	Organisational constraints external to project	When usability is initiated	Create and followthe usability requirements	Nurture usability understanding	Making usability real to create a shared vision for project stakeholders	Project decisions embrace a usability mindset	Usability goals promote a usability mindset	Usability maturity requires transformation of the organisational culture	Usability activities involvement enhances usability mindset	Usability education of project stakeholders	Measuring usability goals	Maintain flexibility with usability practice	Managing stakeholder involvement	Evangelising usability to project stakeholders	Skillset and experience of usability practitioner	Validation of usability practice	Usability team practices	Demonstrate value in engaging usability practitioners
Establish a shared usability vision using collaboration	13	6	10	5	10	0	0	0	0	5	0	0	6	12	3	4	6	9	4	3	1	5	4	1	1	0	0
Involvement by all project stakeholders enhances the collaborative approach	6	18	11	7	7	2	0	3	1	8	0	2	6	7	0	1	5	8	2	0	0	3	2	2	0	1	1
Crucial involvement by IS project team members	10	11	20	7	13	1	2	1	4	11	3	9	10	16	1	9	8	15	4	4	2	11	4	5	2	2	3
Senior organisational stakeholder involvement	5	7	7	17	8	0	1	0	2	9	1	0	5	4	2	3	6	2	3	2	0	0	1	3	2	1	1
Project stakeholder relationships must be fostered	10	7	13	8	20	1	2	0	3	8	2	2	6	8	3	8	8	4	4	2	2	2	0	5	1	3	4
Usability activities compliance within a project lifecycle	0	2	1	0	1	14	1	0	3	1	4	4	2	1	1	1	4	0	0	2	2	0	3	0	0	0	0
Constraints dictate usability activity selection & performance	0	0	2	1	2	1	17	1	17	7	2	1	3	0	0	1	2	0	0	2	4	0	0	3	1	0	0
Technological constraints	0	3	1	0	0	0	1	8	0	2	1	6	1	0	0	1	1	1	0	0	1	0	0	1	0	0	0
Allocating resources to usability activities	0	1	4	2	3	3	17	0	17	9	5	4	3	1	1	2	1	0	1	4	3	0	1	4	2	0	1
Organisational constraints external to project	5	8	11	9	8	1	7	2	9	19	2	4	4	6	1	17	4	6	2	2	8	1	3	3	0	3	2
When usability is initiated	0	0	3	1	2	4	2	1	5	2	14	8	4	3	2	6	3	1	1	5	0	0	2	0	0	1	1
Create and follow the usability requirements	0	2	9	0	2	4	1	6	4	4	8	18	2	1	0	9	2	1	1	7	3	0	0	1	0	1	0
Nurture usability understanding	6	6	10	5	6	2	3	1	3	4	4	2	16	7	3	3	9	10	9	2	1	1	7	5	3	2	0
Making usability real to create a shared vision for project stakeholders	12	7	16	4	8	1	0	0	1	6	3	1	7	18	4	10	6	13	7	4	1	9	5	2	1	0	3
Project decisions embrace a usability mindset	3	0	1	2	3	1	0	0	1	1	2	0	3	4	7	2	1	1	0	4	2	0	2	5	0	1	2
Usability goals promote a usability mindset	4	1	9	3	8	1	1	1	2	17	6	9	3	10	2	20	6	5	1	13	2	2	0	1	1	2	0
Usability maturity requires transformation of the organisational culture	6	5	8	6	8	4	2	1	1	4	3	2	9	6	1	6	20	2	5	2	2	0	7	1	4	4	2
Usability activities involvement enhances usability mindset	9	8	15	2	4	0	0	1	0	6	1	1	10	13	1	5	2	17	3	2	0	9	3	2	1	1	1
Usability education of project stakeholders	4	2	4	3	4	0	0	0	1	2	1	1	9	7	0	1	5	3	12	0	2	0	4	4	1	1	0
Measuring usability goals	3	0	4	2	2	2	2	0	4	2	5	7	2	4	4	13	2	2	0	18	2	0	0	0	0	0	1
Maintain flexibility with usability practice	1	0	2	0	2	2	4	1	3	8	0	3	1	1	2	2	2	0	2	2	13	0	1	5	0	0	0
Managing stakeholder involvement	5	3	11	0	2	0	0	0	0	1	0	0	1	9	0	2	0	9	0	0	0	11	0	1	0	0	1
Evangelising usability to project stakeholders	4	2	4	1	0	3	0	0	1	3	2	0	7	5	2	0	7	3	4	0	1	0	15	1	1	2	0
Skillset and experience of usability practitioner	1	2	5	3	5	0	3	1	4	3	0	1	5	2	5	1	1	2	4	0	5	1	1	14	2	7	2
Validation of usability practice	1	0	2	2	1	0	1	0	2	0	0	0	3	1	0	1	4	1	1	0	0	0	1	2	7	1	1
Usability team practices	0	1	2	1	3	0	0	0	0	3	1	1	2	0	1	2	4	1	1	0	0	0	2	7	1	16	1
Demonstrate value in engaging usability practitioners	0	1	3	1	4	0	0	0	1	2	1	0	0	3	2	0	2	1	0	1	0	1	0	2	1	1	10

Table 7-3: Comparison of concepts based on number of sources that discussed it.

The above table (Table 7-3) shows the list of twenty-seven concepts compared against each other. The diagonal shows the total number of sources for a given concept. The various shades of blue shows the weak and moderate relationship between concepts, while the red shaded concepts comparisons shows the stronger relationships between concepts. The numbers in this table shows the number of sources (interviewee) that has utterances for the concepts involve. The comparison is purely based on the utterance involving both concepts.

Concept Comparison: Coded references	Establish a shared usability vision using collaboration	Involvement by all project stakeholders enhances the collaborative approach	Crucial involvement by IS project team members	Senior organisational stakeholder involvement	Project stakeholder relationships must be fostered	Usability activities compliance within a project lifecycle	Constraints dictate usability activity selection & performance	Technological constraints	Allocating resources to usability activities	Organisational constraints external to project	When usability is initiated	Create and followthe usability requirements	Nurture usability understanding	Making usability real to create a shared vision for project stakeholders	Project decisions embrace a usability mindset	Usability goals promote a usability mindset	Usability maturity requires transformation of the organisational culture	Usability activities involvement enhances usability mindset	Usability education of project stakeholders	Measuring usability goals	Maintain flexibility with usability practice	Managing stakeholder involvement	Evangelising usability to project stakeholders	Skillset and experience of usability practitioner	Validation of usability practice	Usability team practices	Demonstrate value in engaging usability practitioners
Establish a shared usability vision using collaboration	41	10	25	6	12	0	0	0	0	7	0	0	11	24	3	6	7	20	6	3	1	5	6	2	1	0	0
Involvement by all project stakeholders enhances the collaborative approach	10	48	20	8	8	2	0	3	1	12	0	2	9	10	0	1	6	13	3	0	0	4	4	2	0	2	2
Crucial involvement by IS project team members	25	20	128	9	18	1	2	1	5	16	3	11	17	25	1	16	10	40	4	8	2	14	7	5	2	2	3
Senior organisational stakeholder involvement	6	8	9	39	13	0	1	0	3	10	1	0	7	5	2	3	7	4	3	2	0	0	1	3	2	1	2
Project stakeholder relationships must be fostered	12	8	18	13	86	1	2	0	4	11	2	2	11	13	3	10	9	4	5	2	3	2	0	5	1	4	5
Usability activities compliance within a project lifecycle	0	2	1	0	1	32	1	0	3	1	4	4	2	1	1	1	4	0	0	2	2	0	3	0	0	0	0
Constraints dictate usability activity selection & performance	0	0	2	1	2	1	41	1	30	10	2	1	4	0	0	1	3	0	0	2	5	0	0	3	1	0	0
Technological constraints	0	3	1	0	0	0	1	24	0	4	1	13	1	0	0	1	1	1	0	0	1	0	0	1	0	0	0
Allocating resources to usability activities	0	1	5	3	4	3	30	0	49	12	8	4	5	1	1	2	1	0	1	4	4	0	1	4	2	0	1
Organisational constraints external to project	7	12	18	10	11	1	10	4	12	95	3	5	7	9	1	43	5	7	2	2	10	1	7	3	0	3	2
When usability is initiated	0	0	3	1	2	4	2	1	8	3	37	13	7	3	2	6	3	1	1	6	0	0	2	0	0	1	1
Create and follow the usability requirements	0	2	11	0	2	4	1	13	4	5	13	50	2	1	0	11	2	1	1	12	3	0	0	1	0	1	0
Nurture usability understanding	11	9	17	7	11	2	4	1	5	7	7	2	61	12	3	5	12	16	19	2	1	1	10	6	3	2	0
Making usability real to create a shared vision for project stakeholders	24	10	25	5	13	1	0	0	1	9	3	1	12	65	6	14	6	18	10	5	1	12	6	3	1	0	3
Project decisions embrace a usability mindset	3	0	1	2	3	1	0	0	1	1	2	0	3	6	18	2	1	1	0	6	2	0	2	9	0	1	2
Usability goals promote a usability mindset	6	1	16	3	10	1	1	1	2	43	6	11	5	14	2	111	6	8	1	34	2	2	0	1	1	2	0
Usability maturity requires transformation of the organisational culture	7	6	10	7	9	4	3	1	1	5	3	2	12	6	1	6	66	2	5	3	3	0	10	1	6	6	2
Usability activities involvement enhances usability mindset	20	13	40	4	4	0	0	1	0	7	1	1	16	18	1	8	2	46	3	2	0	12	5	2	1	1	1
Usability education of project stakeholders	6	3	4	3	5	0	0	0	1	2	1	1	19	10	0	1	5	3	32	0	3	0	5	6	1	2	0
Measuring usability goals	3	0	8	2	2	2	2	0	4	2	6	12	2	5	6	24	3	2	0	60	3	0	0	0	0	0	1
Maintain flexibility with usability practice	1	0	2	0	3	2	5	1	4	10	0	3	1	1	2	2	3	0	3	3	33	0	1	6	0	0	0
Managing stakeholder involvement	5	4	14	0	2	0	0	0	0	1	0	0	1	12	0	2	0	12	0	0	0	14	0	1	0	0	1
Evangelising usability to project stakeholders	6	4	7	1	0	3	0	0	1	7	2	0	10	6	2	0	10	5	5	0	1	0	39	1	2	3	0
Skillset and experience of usability practitioner	2	2	5	3	5	0	3	1	4	3	0	1	6	3	9	1	1	2	6	0	6	1	1	63	2	12	2
Validation of usability practice	1	0	2	2	1	0	1	0	2	0	0	0	3	1	0	1	6	1	1	0	0	0	2	2	13	1	1
Usability team practices	0	2	2	1	4	0	0	0	0	3	1	1	2	0	1	2	6	1	2	0	0	0	3	12	1	56	1
Demonstrate value in engaging usability practitioners	0	2	3	2	5	0	0	0	1	2	1	0	0	3	2	0	2	1	0	1	0	1	0	2	1	1	18

Table 7-4: Comparison of concepts based on number of coded references that discussed it.

The above table (Table 7-4) is similar to the previous table (Table 7-3) except that instead of the number of sources, this shows the number of actual coded references (utterance) within the transcribed data.

Concept cross reference comparison	All Themes	Collaborative Approach	Project Constraints	Usability Mindset	Usability Practice
Establish a shared usability vision using collaboration	41	41	7	38	22
Involvement by all project stakeholders enhances the collaborative approach	48	48	16	28	17
Crucial involvement by IS project team members	128	128	24	73	42
Senior organisational stakeholder involvement	39	39	10	20	12
Project stakeholder relationships must be fostered	86	86	15	39	24
Usability activities compliance within a project lifecycle	32	3	32	11	7
Constraints dictate usability activity selection & performance	41	4	41	7	9
Technological constraints	24	3	24	13	1
Allocating resources to usability activities	49	8	49	10	14
Organisational constraints external to project	95	33	95	58	24
When usability is initiated	37	4	37	23	11
Create and follow the usability requirements	50	13	30	50	16
Nurture usability understanding	61	33	17	61	38
Making usability real to create a shared vision for project stakeholders	65	46	12	65	36
Project decisions embrace a usability mindset	18	7	4	18	17
Usability goals promote a usability mindset	111	27	49	111	42
Usability maturity requires transformation of the organisational culture	66	25	15	66	29
Usability activities involvement enhances usability mindset	46	43	9	46	23
Usability education of project stakeholders	32	11	3	20	32
Measuring usability goals	60	11	10	48	60
Maintain flexibility with usability practice	33	6	15	8	33
Managing stakeholder involvement	14	14	1	12	14
Evangelising usability to project stakeholders	39	9	11	20	39
Skillset and experience of usability practitioner	63	15	7	19	63
Validation of usability practice	13	5	2	8	13
Usability team practices	56	7	4	9	56
Demonstrate value in engaging usability practitioners	18	10	3	6	18

Table 7-5: Concept coded references for each theme.

The table above (Table 7-5) shows each of the twenty-seven concepts and the number of coded references (utterances) made against each of the four themes.

Sources	Number of Sources	Coded References	Practitioner Background	Typical Day Discussion	Bad usability outcome	Good usability outcome	Other Discussion	Evangelism?	Goal conflict?	Involvement?	Organisational vs Consultants?	Female Practitioners	Male Practitioners	Usability Manager Role	Usability Practitioner	Usability Consultant	Combined	Organisation based practitioner	10 or more year experience	5-9 year experience
Establish a shared usability vision using collaboration	13	41	1	2	3	7	3	2	2	1	2	6	7	8	4	5	3	5	5	8
Involvement by all project stakeholders enhances the c	18	48	1	5	6	9	5	2	1	1	2	7	11	12	5	6	6	6	8	10
Crucial involvement by IS project team members	20	128	1	11	11	14	9	1	3	5	4	7	13	11	8	8	5	7	8	12
Senior organisational stakeholder involvement	17	39	2	2	7	6	3	1	2	1	3	5	12	10	6	7	5	5	6	11
Project stakeholder relationships must be fostered	20	86	2	5	11	12	8	2	2	4	3	7	13	12	7	7	6	7	8	12
Usability activities compliance within a project lifecycle	14	32	1	9	5	4	4	2	0	1	0	4	10	9	5	6	5	3	5	9
Constraints dictate usability activity selection & perform	17	41	0	6	8	6	7	1	1	0	1	6	11	9	7	8	5	4	5	12
Technological constraints	8	24	0	1	7	0	1	0	0	0	0	3	5	5	3	4	3	1	4	4
Allocating resources to usability activities	17	49	0	6	8	7	6	0	3	1	2	6	11	9	7	8	5	4	5	12
Organisational constraints external to project	19	95	0	8	13	7	10	2	7	2	3	7	12	11	7	8	6	5	6	13
When usability is initiated	14	37	0	5	7	6	4	2	3	0	0	5	9	7	7	5	3	6	6	8
Create and follow the usability requirements	18	50	0	9	9	7	3	2	0	0	0	7	11	9	8	8	5	5	6	12
Nurture usability understanding	16	61	1	8	2	9	6	2	3	1	3	5	11	9	6	5	4	7	7	9
Making usability real to create a shared vision for projec	18	65	1	4	6	10	8	3	2	2	2	6	12	11	6	7	4	7	8	10
Project decisions embrace a usability mindset	7	18	0	3	3	4	1	3	1	0	1	1	6	3	3	3	3	1	2	5
Usability goals promote a usability mindset	20	111	0	6	11	9	10	2	7	1	1	8	12	11	8	8	6	6	7	13
Usability maturity requires transformation of the organis	20	66	3	7	8	6	9	2	4	0	3	8	12	11	8	8	6	6	7	13
Usability activities involvement enhances usability mind	17	46	1	1	3	9	7	1	3	1	3	6	11	9	7	6	5	6	6	11
Usability education of project stakeholders	12	32	0	4	1	6	4	2	1	0	3	4	8	7	4	3	3	6	5	7
Measuring usability goals	18	60	0	9	8	7	8	1	3	0	0	6	12	9	8	8	5	5	7	11
Maintain flexibility with usability practice	13	33	1	7	4	1	6	1	1	0	1	4	9	8	5	6	4	3	4	9
Managing stakeholder involvement	11	14	0	1	1	5	3	0	0	1	2	6	5	7	3	4	3	4	4	7
Evangelising usability to project stakeholders	15	39	1	3	4	4	3	6	1	0	1	6	9	8	6	6	5	4	4	11
Skillset and experience of usability practitioner	14	63	3	6	5	7	4	2	1	0	8	5	9	9	4	5	5	4	6	8
Validation of usability practice	7	13	1	1	2	2	2	0	0	0	3	2	5	2	4	4	3	0	1	6
Usability team practices	16	56	1	9	2	4	7	1	1	0	6	6	9	9	6	5	4	6	6	9
Demonstrate value in engaging usability practitioners	10	18	0	3	2	5	2	1	1	1	0	5	5	6	3	5	2	3	4	6
All Themes	22	630	6	21	20	19	17	6	7	5	8	8	13	13	8	8	6	7	8	13
Collaborative Approach	21	240	2	14	17	17	13	4	3	5	5	8	13	12	8	8	6	7	8	13
Project Constraints	21	208	1	14	18	12	13	5	7	3	4	8	13	12	8	8	6	7	8	13
Usability Mindset	21	312	3	14	16	17	14	5	7	3	5	8	13	12	8	8	6	7	8	13
Usability Practice	22	277	5	18	14	17	16	6	6	1	8	8	13	13	8	8	6	7	8	13

Table 7-6: Concepts compared against other attributes showing number of sources that discussed it.

As part of the analysis each concept was compared against the interview questions and each of the other coded attributes. The table above (Table 7-6) shows the number of sources that discussed a concept against the interview questions and the more significant attributes discussed in the analysis, see chapter 5. The more significant other attributes were the gender of the interviewee, the role they predominantly played when performing usability activities (i.e. manager or practitioner), the context in which they performed usability activities (i.e. consultant or organisationally based), and the experience level of the interviewee.

10 or more year experience	Collaborative Approach	Project Constraints	Usability Mindset	Usability Practice	All Themes	Establish a shared usability vision using collaboration	Involvement by all project stakeholders enhances the collaborative approach	Crucial involvement by IS project team members	Senior organisational stakeholder involvement	Project stakeholder relationships must be fostered	Usability activities compliance within a project lifecycle	Constraints dictate usability activity selection & performance	Technological constraints	Allocating resources to usability activities	Organisational constraints external to project	When usability is initiated	Create and followthe usability requirements	Nurture usability understanding	Making usability real to create a shared vision for project stakeholders	Project decisions embrace a usability mindset	Usability goals promote a usability mindset	Usability maturity requires transformation of the organisational culture	Usability activities involvement enhances usability mindset	Usability education of project stakeholders	Measuring usability goals	Maintain flexibility with usability practice	Managing stakeholder involvement	Evangelising usability to project stakeholders	Skillset and experience of usability practitioner	Validation of usability practice	Usability team practices	Demonstrate value in engaging usability practitioners
#01	7	14	10	10	32	0	4	1	1	3	1	2	6	4	4	2	2	0	4	0	4	1	0	0	1	3	0	0	4	0	1	2
#10	14	8	13	16	27	2	2	6	7	5	3	3	0	3	5	1	3	2	3	0	3	5	2	0	2	0	1	0	3	3	2	4
#12	4	1	2	2	7	0	1	2	1	1	0	0	0	0	0	1	0	1	1	0	0	2	0	1	0	0	0	0	0	0	1	0
#13	11	4	13	18	28	1	2	5	0	7	0	0	0	0	0	4	4	3	4	0	5	1	2	1	3	0	0	3	1	0	11	2
#16	9	12	24	25	50	0	2	5	2	2	1	1	1	1	6	4	5	5	1	3	8	3	1	0	1	2	0	3	14	0	7	0
#21	24	19	23	20	49	5	2	7	9	11	3	3	0	3	10	5	1	8	5	2	10	7	5	5	3	6	1	2	6	0	0	1
#04	10	3	6	8	18	1	6	3	1	2	0	0	1	0	2	0	0	3	4	0	2	0	1	3	1	0	1	0	1	0	2	0
#08	23	15	41	28	53	11	7	17	0	5	1	1	5	2	6	0	8	5	15	0	15	1	7	4	18	4	1	4	0	0	0	0
	102	**76**	**132**	**127**	**264**	**20**	**26**	**46**	**21**	**36**	**9**	**10**	**13**	**13**	**33**	**17**	**23**	**27**	**37**	**5**	**47**	**20**	**18**	**14**	**29**	**15**	**4**	**12**	**29**	**3**	**24**	**9**
5-10 years experience																																
#11	8	7	11	7	18	0	0	4	1	0	0	1	3	2	5	0	2	0	0	0	5	5	0	0	1	1	1	2	0	4	0	1
#14	10	9	12	9	27	0	2	8	1	2	2	3	0	4	1	5	1	5	2	2	3	4	2	3	4	0	0	1	1	1	0	0
#15	12	17	15	15	30	0	2	4	1	5	1	4	2	1	10	1	2	2	0	2	8	3	1	0	2	4	0	0	5	1	5	0
#17	19	8	24	19	41	6	1	7	2	11	0	2	0	1	6	0	2	7	5	5	6	4	3	5	5	0	1	2	7	1	2	1
#18	22	14	19	22	42	1	0	10	2	14	1	4	0	4	8	5	5	4	3	3	9	3	2	3	5	3	0	1	3	2	1	2
#19	9	13	14	21	37	2	1	7	3	1	2	3	0	4	7	0	0	4	3	1	8	2	1	3	3	1	1	2	9	0	2	2
#02	5	11	9	8	20	0	0	3	1	2	3	2	0	3	5	1	2	1	1	0	4	2	1	0	1	2	0	2	0	0	3	0
#20	15	17	25	20	42	3	2	12	1	4	1	6	0	6	6	5	1	8	3	0	3	9	6	2	0	3	2	7	4	0	6	1
#03	11	7	16	9	25	2	3	10	0	1	0	3	0	5	2	1	2	1	4	0	7	2	4	1	4	0	3	0	0	0	1	0
#05	14	5	15	15	29	5	3	8	1	4	2	1	0	2	2	0	3	2	3	0	1	5	5	1	3	1	1	1	2	1	4	2
#06	1	5	5	2	10	0	1	0	0	1	0	0	4	0	1	0	3	0	0	0	3	1	0	0	0	0	0	1	1	0	0	0
#07	10	11	12	7	25	1	1	5	3	2	5	1	2	2	3	1	3	0	1	0	2	5	1	0	2	1	1	1	0	0	2	0
#09	6	13	10	5	19	1	2	3	2	3	6	1	0	2	6	1	1	0	3	0	5	1	2	0	1	2	0	2	0	0	0	0
	142	**137**	**187**	**159**	**365**	**21**	**18**	**81**	**18**	**50**	**23**	**31**	**11**	**36**	**62**	**20**	**27**	**34**	**28**	**13**	**64**	**46**	**28**	**18**	**31**	**18**	**10**	**22**	**32**	**10**	**26**	**9**
Total	244	213	319	286	629	41	44	127	39	86	32	41	24	49	95	37	50	61	65	18	111	66	46	32	60	33	14	34	61	13	50	18
High %	42	36	41	44	42	49	59	36	54	42	28	24	54	27	35	46	46	44	57	28	42	30	39	44	48	45	29	35	48	23	48	50
Low %	58	64	59	56	58	51	41	64	46	58	72	76	46	73	65	54	54	56	43	72	58	70	61	56	52	55	71	65	52	77	52	50
High Prop	110	94	109	117	110	128	155	95	141	110	74	64	142	70	91	121	121	116	149	73	111	80	103	115	127	119	75	93	125	61	126	131
Low Prop	94	104	95	90	94	83	66	103	75	94	116	122	74	119	105	87	87	90	70	117	93	113	98	91	83	88	115	105	85	124	84	81

Table 7-7: A more detail analysis between the usability practitioner with 5-9 year experience and 10 or more year's experience

The above table (Table 7-7) shows a breakup of the very experienced usability practitioners and the 5-9 year practitioners across the concepts. It provided the analysis an indication of which concepts were supported more strongly by each group of practitioners.

Appendix E – Intermediary Concept Coded

Sources	Sources	Coded References	E : Usability_Story_Background	I : Usability_Story_Typical_Day	G : Usability_Story_Good	F : Usability_Story_Bad	H : Usability_Story_Other		A : Question_Evangelism	B : Question_Goal_Conflict	D : Question_Organ_Vs_Cons	C : Question_Involvement	
1 : AC - must have senior organisational stakeholder	6	7	1	0	1	2	1		0	0	2	0	
2 : AC - needs to be at all levels	2	4	0	0	2	0	2		0	0	0	0	
3 : AC - organisational stakeholder	10	16	1	2	4	2	2		0	0	3	0	
4 : AC - project team stakeholders	8	10	0	0	4	3	1		0	1	0	1	
5 : AC - through promoting understanding	5	7	0	1	2	1	0		0	0	1	0	
6 : AC - through third part validation	1	2	0	0	0	0	1		0	0	0	0	
7 : AF - consideration for project variable in choosing usability activity to use	7	9	0	4	0	1	2		1	0	0	0	
8 : AF - flexbility needed in which usability activity used	8	16	1	4	0	1	4		1	0	1	0	
9 : AF - flexibility within a usability activity to maximise usability outcome	2	2	0	1	0	0	1		0	0	0	0	
10 : CO - based on developing relationship and collaborative team work	7	8	2	0	3	2	0		0	0	0	1	
11 : CO - getting people involved in usability activities	3	3	0	0	2	0	0		0	0	0	1	
12 : CO - must be a cultural shift at an organisational level	10	15	2	0	1	4	1		1	3	0	0	
13 : CO - project manager (or other project team stakeholder) committed to usability	7	9	1	0	4	3	0		0	0	0	0	
14 : CO - usability commitment is impacted on by various constraints	7	7	0	1	2	4	0		0	0	0	0	
15 : CR - performance or not of usability based on project risk	6	6	0	0	1	2	1		0	1	0	0	
16 : CR - project constraints hampers performance of usabililty	10	16	0	2	1	5	2		1	1	1	0	
17 : CR - usability requirements need to create time and budget fit in project plan	5	5	0	1	2	0	0		0	1	0	1	
18 : CR - value in performance of usability upfront - spending on support and training r	7	10	0	2	1	2	2		0	1	0	0	
19 : DI - Developer pushback on making any changes	4	4	0	2	0	2	0		0	0	0	0	
20 : DI - Development team does not take usability seriously	3	4	0	1	1	0	0		0	0	1	0	
21 : DI - involving developers in usability can improve understanding of technological li	5	5	0	0	0	1	1		1	0	2	0	
22 : DI - performing usability activities in parallel with other process activities	2	3	0	0	0	2	0		0	0	0	0	
23 : DI - Usability brought in late and developers not time to change	2	3	0	1	0	1	0		0	0	0	0	
24 : ET - Brought in late, no time to do usability, don't start	1	2	0	1	0	1	0		0	0	0	0	
25 : IE - importance of considering technical perspective	2	5	0	2	0	0	1		0	0	1	0	
26 : IE - practitioner gained technical knowledge	1	2	0	1	0	0	0		0	0	1	0	
27 : IE - practitioner has technical background	3	3	3	0	0	0	0		0	0	0	0	
28 : IN - at least one stakeholder champion is needed	3	6	0	0	2	2	1		0	0	0	0	
29 : IN - involvement by all stakeholders impacted by the project	18	44	0	5	5	6	4		0	1	1	4	
30 : IN - involvement creates shared vision	8	20	1	1	3	2	3		1	0	1	1	
31 : IN - involvement improves usability understanding and buy-in	10	14	1	1	5	0	0		1	1	1	0	
32 : IN - involvement in usability activities generates feedback	16	38	0	4	8	4	1		1	1	2	2	
33 : IN - Involving all stakeholder highlights conflicting views to be balanced	8	10	0	0	1	1	4		0	3	0	0	
34 : IN - involving users better than user advocacy	5	6	0	1	1	1	0		0	1	1	0	
35 : IN - involvment of stakeholders lead to improved communication	6	9	0	0	2	0	2		0	2	0	2	
36 : IN - IT stakeholder involvement is preferred over user advocacy	10	20	0	3	5	1	3		1	0	1	0	
37 : IN - must have involvment of business stakeholders	10	15	0	0	5	3	2		0	2	0	1	
38 : IN - need to make it understandable usability activities understandable to stakehol	3	4	0	1	2	0	0		0	0	0	0	
39 : IN - Usability practitioner role to manage user involvement	2	2	0	1	1	0	0		0	0	0	0	
40 : IN- Involvement should be maintained throughout a process	2	3	0	0	0	1	0		0	0	0	1	
41 : KH - education and experience needed	5	12	0	1	3	1	1		0	1	1	0	
42 : KH - experience based understanding of usability used in usability decision	5	9	0	1	2	2	1		1	0	1	0	
43 : KH - professional opinion given based on experience	3	3	0	0	1	1	0		0	0	1	0	
44 : KH - working on different domains broadens usability experience	3	4	0	0	1	0	0		1	0	2	0	
45 : KH - working with a team enhances usability experience pool	3	6	0	1	2	0	0		0	0	2	0	
46 : MA - Any usability success can improve lead to increased usability maturity	3	5	1	1	1	0	1		0	0	0	0	
47 : MA - As a usability consultant involvement improving usability maturity can be mor	3	3	1	1	1	0	0		0	0	0	0	
48 : MA - Establishment and adherence to the performance of usability activities in a d	5	7	1	3	0	1	1		1	0	0	0	
49 : MA - Improving organisational and stakeholder's usability maturity requires improv	17	34	2	4	5	6	6		2	2	1	0	
50 : MA - Organisational politics can create pushback on the acceptance of usability	3	6	0	1	0	3	0		0	1	0	0	
51 : MA - Setting up a good relationship between various stakeholders is needed	3	5	0	0	2	1	0		0	0	0	1	
52 : MA - Usability outcomes need external validation – no trust of internal usability tea	2	2	0	0	1	1	1		0	0	0	0	
53 : ME - choose appropriate usability activity to gather measures needed	4	4	0	3	1	0	0		0	0	0	0	
54 : ME - need to followup usabillity goals throughout project by performing measurem	6	6	0	0	3	1	1		0	1	0	0	
55 : ME - qualitative or quantitative measures	5	6	0	2	1	2	0		1	0	0	0	
56 : ME - usability measures can aide in making usability decisions	3	5	0	1	1	1	0		0	1	0	0	
57 : MI - configurable software have usability limitation	1	1	0	0	0	1	0		0	0	0	0	
58 : MI - lack of understanding of usability goals and activities	6	9	0	1	1	5	0		1	0	0	0	
59 : MI - usability practitioner labelled as usability tester	1	1	0	0	1	0	0		0	0	0	0	
60 : MR - Documentation can aide in making usability real to stakeholders	4	4	0	1	1	1	0		1	0	0	0	
61 : MR - Observational usability research provides evidence to makes its real	2	5	0	0	2	0	1		0	0	0	0	
62 : MR - Stakeholder involvement in observation increases the realism of usability act	9	12	0	0	4	1	3		0	0	2	1	
63 : MR - Usability Practitioner needs to increase understanding by all stakeholders by	6	8	0	1	2	0	3		1	0	0	0	
64 : OC - all information, including elicited domain information, is reported, by consulta	1	2	0	0	0	0	1		0	0	0	0	
65 : OC - Consultants are constrained by the allocated budget	2	2	0	0	0	0	0		0	0	2	0	
66 : OC - consultants do not have to deal with organisational politics	2	3	0	0	0	1	0		0	0	1	0	
67 : OC - consultants often do not need to sell the usability service	3	7	0	2	0	0	0		2	0	1	0	
68 : OC - consultants used to validate findings of internal usability team	2	2	0	0	0	0	2		0	0	0	0	

69 : OC - need a specific usability skill, hire consultant for a parcel of usability work	7	11	0	2	0	0	1		1	0	5	0	
70 : OC - organisation usability team not taken seriously and resistance from other pro	2	2	0	0	0	0	1		0	0	1	0	
71 : OC - organisational teams can improve organisations usability maturity	1	3	0	1	0	0	0		0	1	1	0	
72 : OC - usability teams experienced based on exposure to a number of domain	6	8	0	1	0	0	1		0	0	5	0	
73 : OU - lack of usability resource, need for usability consultants	3	3	0	1	0	0	0		0	0	1	0	
74 : PC - lack of access or involvement	2	4	0	1	0	2	0		0	0	0	0	
75 : PC - must have flexibility to improve usability otherwise usability ignored	1	4	0	1	0	1	0		0	0	0	0	
76 : PC - political constraints impact on usability	6	11	0	2	0	2	0		0	0	2	2	
77 : PP - changing with performance of usability activities	6	7	0	2	1	2	2		0	0	0	0	
78 : PP - creating a user centered design plan to improve usability outcome	7	11	0	5	2	1	2		0	0	0	1	
79 : PP - maximise scope of usability given time, cost and other constraints	7	8	0	2	3	1	1		0	0	0	0	
80 : PP - process structure	5	5	0	4	1	0	0		0	0	0	0	
81 : RE - business goals can take priority in usability requirements	5	12	0	1	2	2	1		0	3	1	0	
82 : RE - compliance to organisational process	5	6	0	3	0	0	0		1	1	0	0	
83 : RE - education of organisation improves generation of usbaility requirements	1	1	0	0	1	0	0		0	0	0	0	
84 : RE - effective communication of usability requirements	1	1	0	0	1	1	0		0	0	0	0	
85 : RQ - develope-emerge from the research of all project stakeholders	8	9	0	5	2	1	2		0	0	0	0	
86 : RQ - importance of articulating usabillity requirements upfront	6	11	0	2	2	3	1		1	0	0	0	
87 : RQ - performing usability activities with a eye on the usability requirements	2	3	0	1	1	1	0		1	0	0	0	
88 : RQ - provide a set of usability goals that describes the projects usability outcome	12	31	0	4	6	5	4		0	1	1	0	
89 : RQ - requirement reveal more than just features, like the way people work	6	6	0	2	3	1	0		0	0	0	0	
90 : RQ - used to create a shared vision for project	1	2	0	0	0	1	1		0	0	0	0	
91 : RT - must allow appropriate time to reflect on results of usability activities	3	5	0	2	1	0	0		0	0	0	1	
92 : SA - stakeholders see value in usability practitioners role	5	9	0	0	3	1	1		0	1	0	0	
93 : SA - usability practitioner are user advocates	5	6	0	0	1	2	1		0	0	1	0	
94 : SC - communicate to achieve understanding in the project	4	13	0	2	3	1	1		0	1	0	0	
95 : SC - communicate to achieve usability buy-in	3	3	0	0	1	0	1		0	1	0	0	
96 : SC - communication across project important skill for usability practitioner	3	3	0	0	0	0	1		0	0	2	0	
97 : SC - established communication across all stakeholders	12	24	0	2	6	3	4		2	0	0	2	
98 : SC - involving all stakeholders at start	3	3	0	0	0	0	1		0	0	0	2	
99 : SC - lack of trust in the communication with stakeholders	3	4	0	0	0	2	0		0	1	0	0	
100 : SC - through usability document	5	10	0	1	2	2	2		0	0	0	1	
101 : SG - linking is done at various level across the organisation	2	2	0	0	1	0	1		0	0	0	0	
102 : SG - provide a link across various stakeholder groups	5	10	0	1	2	0	2		0	0	0	2	
103 : SP - articulate what the focus of usability work is for project	5	8	0	3	2	3	0		0	0	0	0	
104 : SP - look to what usability activities would be appropriate for project	2	2	0	1	0	1	0		0	0	0	0	
105 : SP - no flexibility in project plan to iterate	2	2	0	0	0	0	1		1	0	0	0	
106 : SV - create shared vision through usability document	5	8	0	1	2	2	2		0	0	0	0	
107 : SV - create shared vision where conflict between stakeholders	8	10	0	0	2	2	1		0	2	0	1	
108 : SV - need to be constantly communicating with stakeholders to create shared vis	2	2	1	0	1	0	0		0	0	0	0	
109 : SV - Shared vision created through involvement in usability activities	8	15	1	0	5	1	2		0	1	1	0	
110 : SV - shared vision impacted on by leadership-ownership	4	11	0	0	2	2	2		0	0	0	0	
111 : SV - shared vision through exposure to usability	4	8	0	0	1	0	1		1	1	2	0	
112 : SW - developers	2	2	0	0	1	1	0		0	0	0	0	
113 : SW - focus on primary user	8	11	0	0	2	2	1		0	0	1	2	
114 : SW - focus wrong user	3	3	0	0	0	2	1		0	0	0	0	
115 : SW - need senior project sponsor	3	4	0	0	1	1	0		0	0	0	0	
116 : SW - surrogate user - advertising	1	1	0	0	0	0	1		0	0	0	0	
117 : SW - surrogate user - legal	3	3	0	0	1	1	0		0	0	1	0	
118 : TC - changes to software package a risk	3	4	0	0	0	3	1		0	0	0	0	
119 : TC - configurable software product	6	10	0	0	0	6	0		0	0	0	0	
120 : TC - relationship with technologist to understand limitations	4	4	0	1	1	0	1		0	0	1	0	
121 : TC - usability requirements considered in vendor-software selection	6	13	0	1	0	5	0		0	0	0	0	
122 : TC - vendor willingness to make changes to software product	2	4	0	0	0	2	0		0	0	0	0	
123 : TE - broad multi-disciplinary team	4	6	0	1	0	1	1		0	0	2	0	
124 : TE - doing usability activities in a team	10	22	1	4	2	1	5		1	0	0	0	
125 : TE - have a set of peer to bounce ideas off	2	2	0	1	0	0	0		0	0	1	0	
126 : TE - involvement is based on practitioner strengths	2	2	0	0	1	0	1		0	0	0	0	
127 : TE - need to carefully allocate team to usabiilty activities	2	2	0	1	0	0	0		0	0	0	0	
128 : TE - predominantly work as individual	5	7	0	3	2	1	1		0	0	0	0	
129 : TG - better usability understanding by business stakeholder greater traction on ti	3	5	0	0	1	1	0		0	2	0	1	
130 : TG - dictates the usability activities possible	14	25	0	2	5	6	5		0	0	1	0	
131 : TG - interest in usability outcomes deteriotes over time	2	2	0	0	0	2	0		0	0	0	0	
132 : TG - involvement from the start can improve time given to usability	4	4	0	0	2	0	1		0	1	0	0	
133 : TG - timeframes given impacts on the usability analysis and outcomes	8	10	0	4	2	2	1		0	0	0	0	
134 : UA - Does a usability activity add usability value	2	2	0	1	0	0	1		0	0	0	0	
135 : UA - First Contact must show usability value	2	2	0	1	0	0	1		0	0	0	0	
136 : UA - Stakeholder involvement improves usability value	1	2	0	0	1	0	0		0	0	0	0	
137 : UA - Value is not in the usability activity performed, it's the value to the client	1	1	0	0	1	1	0		0	0	0	0	
138 : UE - Organisational sponsors need to be educated as early as possible	1	1	0	0	1	0	0		0	0	0	0	
139 : UE - Usability education can be used to explain why usability needs to be consic	3	5	0	1	2	1	0		0	1	0	0	
140 : UE - Usability education for the novice usability stakeholder of a project	6	18	0	2	4	0	2		1	1	3	0	
141 : UE - Usability Education is a must do role by a usability practitioner	2	2	0	0	0	1	0		0	1	0	0	
142 : UE - Usability education is the teaching of a mindset	4	8	0	1	0	0	2		1	1	1	0	
143 : UE - Using usability education to get stakeholder advocacy	5	5	0	0	1	0	2		0	2	0	0	
144 : UG - conflicting goals need to be concorded	17	39	0	2	2	4	7		1	7	0	1	

145 : UG - eliciting usability goals using various usability activities	4	7	0	3	2	2	0		0	0	0	0	
146 : UG - examine conflict through performance of usability activities	4	4	0	1	0	0	2		0	1	0	0	
147 : UG - important to set usability goals hence defining usability	9	20	0	2	3	1	5		0	2	0	0	
148 : UG - prioritising goals required	9	14	0	1	0	1	4		1	3	0	0	
149 : UG - utilising usability goals to contextualise usability activities	3	6	0	1	0	0	2		0	1	0	0	
150 : UM - Mentor-Advise others on all things usability	2	3	0	2	0	0	0		0	0	0	0	
151 : UM - Novice usbaility practitioners skill-up through mentoring	2	6	0	0	1	0	1		1	0	1	0	
152 : UM - Usability mentoring can be a role played by usability practitioner	5	7	0	4	0	0	1		1	0	1	0	
153 : UM - Usability mentoring helps develop usability team and its effectiveness	2	3	0	1	0	0	1		0	0	0	0	
154 : UR - client is informed of the structure of usability report	2	2	0	0	1	1	0		0	0	0	1	
155 : UR - documentation a key deliverable of the usability work	6	13	0	2	1	2	2		0	1	0	0	
156 : UR - providing hard facts and figures is important for usability credability	3	3	0	1	0	1	0		1	0	0	0	
157 : UR - unexpected or alarming results should be carefully communicated	2	3	0	0	1	2	0		0	0	0	0	
158 : US - Get in early so you can sell what usability can do	2	2	0	0	1	0	0		1	0	0	0	
159 : US - Need thrid party usabilty professionals to give stamp of approcal	1	1	0	0	0	0	1		0	0	0	0	
160 : US - Selling the importance of usability through stakeholder involvement	1	1	0	0	1	0	0		0	0	0	0	
161 : US - Selling the usability mindset to improve decision making throughout an IT pr	4	5	0	2	1	0	0		2	0	0	0	
162 : US - Usability selling is an important role played by usability practitioners	4	7	0	2	0	0	0		2	1	0	0	
163 : UV - Getting key stakeholders on side with concept of usability	5	7	1	1	1	2	1		0	0	0	0	
164 : UV - Importance of organisational sponsorship and stakeholder advocacy	4	7	1	0	0	3	1		1	0	0	0	
165 : UV - Increasing need for usability practitioners	1	1	0	0	0	0	0		1	0	0	0	
166 : UV - Integration of usability into an organisational process	5	6	0	1	1	1	1		2	0	0	0	
167 : UV - Organisational culture shift (maturity) towards embracing usability concepts	10	17	1	2	0	3	2		1	2	2	0	
168 : UV - Seeing is believing - involving stakeholders	6	7	0	0	4	0	0		1	0	1	0	
169 : UV - Selling concept of usability is a required skill	4	7	0	1	0	0	1		2	0	1	0	
170 : UV - Usability practitioners role to evangelise usability	11	17	1	3	1	2	1		4	0	1	0	
171 : WO - conflicting goals lead to unsatisfactory usability outcome	1	1	0	0	0	1	0		0	0	0	0	
172 : WO - lack of configurability-traction with software leads to focus on support of usa	3	3	0	0	0	3	0		0	0	0	0	

Table 7-8: List of intermediary concepts coded.

The above table (Table 7-8) shows a list of coded concepts that emerged from the initial list of coded concepts shown in Appendix G. Each of these concept had Memos which were used during the analysis to discover key groupings. The groupings created have been shown in Appendix F.

Appendix F – Initial Concepts to Final Concepts

This appendix provides a list of the final twenty-seven concepts along with the group of intermediary concepts that were found to be related during the analysis stages of the research.

1. Create and follow the usability requirements

RE - education of organisation improves generation of usability requirements
RE - effective communication of usability requirements
RQ - developed-emerge from the research of all project stakeholders
RQ - importance of articulating usability requirements upfront
RQ - performing usability activities with a eye on the usability requirements
RQ - requirement reveal more than just features, like the way people work
SP - articulate what the focus of usability work is for project
TC - usability requirements considered in vendor-software selection

2. Nurture usability understanding

AC - through promoting understanding
IE - importance of considering technical perspective
IN - involvement improves usability understanding and buy-in
IN - need to make it understandable usability activities understandable to stakeholders
MR - Usability Practitioner needs to increase understanding by all stakeholders by make it real
TG - better usability understanding by business stakeholder greater traction on time given
UE - Organisational sponsors need to be educated as early as possible
UE - Usability education can be used to explain why usability needs to be considered throughout a process (not just at end)
UE - Usability education is the teaching of a mindset
UE - Using usability education to get stakeholder advocacy
UM - Mentor-Advise others on all things usability

3. Making usability real to create a shared vision for project stakeholders

MR - Documentation can aide in making usability real to stakeholders
MR - Observational usability research provides evidence to makes its real
MR - Stakeholder involvement in observation increases the realism of usability activities and engages them
MR - Usability Practitioner needs to increase understanding by all stakeholders by make it real
RQ - used to create a shared vision for project
SV - create shared vision through usability document
SV - create shared vision where conflict between stakeholders
SV - need to be constantly communicating with stakeholders to create shared vision
SV - shared vision impacted on by leadership-ownership
SV - shared vision through exposure to usability
US - Selling the usability mindset to improve decision making throughout an IS project

4. Project decisions embrace a usability mindset

KH - experience based understanding of usability used in usability decision
ME - usability measures can aide in making usability decisions
US - Selling the usability mindset to improve decision making throughout an IS project

5. Usability goals promote a usability mindset

ME - need to follow-up usability goals throughout project by performing measurements
MI - lack of understanding of usability goals and activities
RE - business goals can take priority in usability requirements
RQ - provide a set of usability goals that describes the projects usability outcome
UG - conflicting goals need to be concorded
UG - important to set usability goals hence defining usability
UG - prioritising goals required
WO - conflicting goals lead to unsatisfactory usability outcome

6. Usability maturity requires transformation of the organisational culture

CO - must be a cultural shift at an organisational level
MA - Any usability success can improve lead to increased usability maturity
MA – As a usability consultant involvement improving usability maturity can be more difficult
MA - Improving organisational and stakeholder's usability maturity requires improved usability understanding
OC - organisational teams can improve organisations usability maturity
UV - Organisational culture shift (maturity) towards embracing usability concepts

7. Usability activities involvement enhances usability mindset

IN - involvement improves usability understanding and buy-in
IN - Involving all stakeholder highlights conflicting views to be balanced
MR - Stakeholder involvement in observation increases the realism of usability activities and engages them
SV - Shared vision created through involvement in usability activities
UV - Seeing is believing - involving stakeholders

8. Establish a shared usability vision using collaboration

IN - involvement creates shared vision
MR - Documentation can aide in making usability real to stakeholders
SG - linking is done at various level across the organisation
SV - need to be constantly communicating with stakeholders to create shared vision
SV - Shared vision created through involvement in usability activities
SV - shared vision through exposure to usability

9. Crucial involvement by IS project team members

AC - project team stakeholders
CO - project manager (or other project team stakeholder) committed to usability
DI - involving developers in usability can improve understanding of technological limitations
IN - IT stakeholder involvement is preferred over user advocacy
TC - relationship with technologist to understand limitations
DI - Developer pushback on making any changes
DI - Development team does not take usability seriously

10. Involvement by all project stakeholders enhances the collaborative approach

AC – needs to be at all levels
CO - getting people involved in usability activities
IN - involvement by all stakeholders impacted by the project
IN - involvement in usability activities generates feedback
IN - Involving all stakeholder highlights conflicting views to be balanced
IN - involving users better than user advocacy
IN - Involvement should be maintained throughout a process
MR - Stakeholder involvement in observation increases the realism of usability activities and engages them
RQ - developed-emerge from the research of all project stakeholders
SC - involving all stakeholders at start
SV - Shared vision created through involvement in usability activities
UA - Stakeholder involvement improves usability value
UE - Using usability education to get stakeholder advocacy
US - Selling the importance of usability through stakeholder involvement
UV - Getting key stakeholders on side with concept of usability
UV - Seeing is believing - involving stakeholders
IN - Involvement should be maintained throughout a process
PC - lack of access or involvement

11. Senior organisational stakeholder involvement

AC - must have senior organisational stakeholder
AC - organisational stakeholder
IN - must have involvement of business stakeholders
SW - need senior project sponsor
UV - Importance of organisational sponsorship and stakeholder advocacy

12. Project stakeholder relationships must be fostered

CO - based on developing relationship and collaborative team work
IN - involvement of stakeholders lead to improved communication
MA - Setting up a good relationship between various stakeholders is needed
MR - Documentation can aide in making usability real to stakeholders
SC - communicate to achieve understanding in the project
SC - communicate to achieve usability buy-in
SC - communication across project important skill for usability practitioner
SC - established communication across all stakeholders
SC - lack of trust in the communication with stakeholders
SC - through usability document

SG - linking is done at various level across the organisation
SG - provide a link across various stakeholder groups
SV - need to be constantly communicating with stakeholders to create shared vision
SW – developers
SW - focus on primary user
SW - focus wrong user
SW - surrogate user – advertising
SW - surrogate user – legal
TC - relationship with technologist to understand limitations
UR - unexpected or alarming results should be carefully communicated

13.Usability activities compliance within a project lifecycle

DI - performing usability activities in parallel with other process activities
MA - Establishment and adherence to the performance of usability activities in a development process
PP - creating a user cantered design plan to improve usability outcome
UV - Integration of usability into an organisational process

14.Constraints dictate usability activity selection & performance

AF - consideration for project variable in choosing usability activity to use
CR - performance or not of usability based on project risk
SP - articulate what the focus of usability work is for project
SP – no flexibility in project plan to iterate
TG – Time given dictates the usability activities possible

15.Technological constraints

MI - configurable software have usability limitation
TC - changes to software package a risk
TC - configurable software product
TC - usability requirements considered in vendor-software selection
WO - lack of configurability-traction with software leads to focus on support of usability issues

16.Allocating resources to usability activities

CR - usability requirements need to create time and budget fit in project plan
OC - Consultants are constrained by the allocated budget
PP - maximise scope of usability given time, cost and other constraints
TG - better usability understanding by business stakeholder greater traction on time given
TG - dictates the usability activities possible
TG - interest in usability outcomes deteriorates over time
TG - timeframes given impacts on the usability analysis and outcomes

17.Organisational constraints external to project

CO - usability commitment is impacted on by various constraints
CR - project constraints hampers performance of usability
IN - at least one stakeholder champion is needed
OU - lack of usability resource, need for usability consultants
PC - political constraints impact on usability
PP - changing with performance of usability activities
TC - relationship with technologist to understand limitations
TC - vendor willingness to make changes to software product
UG - conflicting goals need to be concorded
WO - conflicting goals lead to unsatisfactory usability outcome
MA - Organisational politics can create pushback on the acceptance of usability

18.When usability is initiated

CR - value in performance of usability upfront - spending on support and training rather than usability upfront
DI - Usability brought in late and developers not time to change
ET - Brought in late, no time to do usability, don't start
RQ - importance of articulating usability requirements upfront
TG - involvement from the start can improve time given to usability
UA - First Contact must show usability value
UE - Organisational sponsors need to be educated as early as possible
UE - Usability education can be used to explain why usability needs to be considered throughout a process (not just at end)
US - Get in early so you can sell what usability can do

19.Usability education of project stakeholders

IN - need to make it understandable usability activities understandable to stakeholders
MR - Usability Practitioner needs to increase understanding by all stakeholders by make it real
UE - Usability education for the novice usability stakeholder of a project
UE - Usability Education is a must do role by a usability practitioner

20.Measuring usability goals

ME - choose appropriate usability activity to gather measures needed
ME - need to follow-up usability goals throughout project by performing measurements
ME - qualitative or quantitative measures
ME - usability measures can aide in making usability decisions
SP - articulate what the focus of usability work is for project
UG - eliciting usability goals using various usability activities
UG - examine conflict through performance of usability activities
UG - important to set usability goals hence defining usability
UG - utilising usability goals to contextualise usability activities
UR - providing hard facts and figures is important for usability credibility

21.Maintain flexibility with usability practice

AF - flexibility needed in which usability activity used
AF - flexibility within a usability activity to maximise usability outcome
PC - must have flexibility to improve usability otherwise usability ignored
PP - changing with performance of usability activities
RE - compliance to organisational process

22.Managing stakeholder involvement

IN - Usability practitioner role to manage user involvement
MR - Stakeholder involvement in observation increases the realism of usability activities and engages them

23.Evangelising usability to project stakeholders

IN - at least one stakeholder champion is needed
MI - usability practitioner labelled as usability tester
US - Usability selling is an important role played by usability practitioners
UV - Selling concept of usability is a required skill
UV - Usability practitioners role to evangelise usability
OC - consultants often do not need to sell the usability service
US - Get in early so you can sell what usability can do
US - Selling the usability mindset to improve decision making throughout an IS project
UV - Selling concept of usability is a required skill

24.Skillset and experience of usability practitioner

IE - practitioner gained technical knowledge
IE - practitioner has technical background
KH - education and experience needed
KH - experience based understanding of usability used in usability decision
KH - professional opinion given based on experience
KH - working on different domains broadens usability experience
OC - need a specific usability skill, hire consultant for a parcel of usability work
OC - usability teams experienced based on exposure to a number of domain
SA - usability practitioner are user advocates
SC - communication across project important skill for usability practitioner
SP - look to what usability activities would be appropriate for project
TE - involvement is based on practitioner strengths
UM - Novice usability practitioners skill-up through mentoring
UM - Usability mentoring can be a role played by usability practitioner

25.Validation of usability practice

AC - through third part validation
MA - As a usability consultant involvement improving usability maturity can be more difficult
MA - Usability outcomes need external validation – no trust of internal usability team
OC - consultants do not have to deal with organisational politics
OC - consultants used to validate findings of internal usability team
US - Need third party usability professionals to give stamp of approval

26.Usability team practices

KH - working with a team enhances usability experience pool
OC - organisation usability team not taken seriously and resistance from other project team members
OC - organisational teams can improve organisations usability maturity
OC - usability teams experienced based on exposure to a number of domain
TE - broad multi-disciplinary team
TE - doing usability activities in a team
TE – have a set of peer to bounce ideas off
TE - need to carefully allocate team to usability activities
TE - predominantly work as individual
UM - Usability mentoring helps develop usability team and its effectiveness
UM - Usability mentoring helps develop usability team and its effectiveness

27.Demonstrate value in engaging usability practitioners

RT – must allow appropriate time to reflect on results of usability activities
SA - stakeholders see value in usability practitioners role
UA - Does a usability activity add usability value
UA - Value is not in the usability activity performed, it's the value to the client
UV - Increasing need for usability practitioners
UA - Stakeholder Involvement improves usability value

Appendix G – Initial Coding Categories and Sub Categories

- **Practitioner Attributes** – various demographic categories used to aide the discovery of relationships (axial coding).
    - Usability practitioner's academic background
    - Work experience
    - Gender
    - Name
    - Work practice perspective, either usability consultant, organisational-base practitioner or combination
    - Usability practitioners role, either usability management or usability practitioner
- **Practitioner Discussion** – represents the answers given by practitioner to the four main interview questions, the four additional questions and includes a follow-up "other" category (as discussed in Section 3.8). This will also be used to aide in the discovery of relationships in the data against other categories and concepts coded.
    - Background of usability practitioner
    - Typical Day of a usability practitioner
    - Story with a bad usability outcome
    - Story with a good usability outcome
    - Other discussion no related to other questions
    - Is evangelism performed as part of being usability practitioner?
    - How often do conflicting goals arise?
    - When do you employ involvement in usability activities?
    - Is there a different between being a usability consultant and organisational-based usability practitioner?

- **Usability Phase** – describes various points in a project where usability activities were performed. Usability practitioners described involvement at specific phases or across multiple phases of a project. The various comments made by practitioners have been categories by these phases. The number of coded references across these phases was very low. The open coding of this category could not be done in all cases, for this reason these categories were not used for comparison in this research.
    - Concept and market analysis
    - Research and analysis
    - Design and information architecture
    - Evaluation
    - Implementation and development
    - Post implementation activities and follow-up
- **Stakeholder Factors** – these factors have an affect on various stakeholders involved in a project. These stakeholders may include the project manager, business analyst, developers, the subject matter experts (users), surrogate users (affected by the project), and business managers. The initial coding and analysis has derived the following stakeholder categories:
    - Advocacy for stakeholders
    - Communication
    - Involvement of stakeholders
    - Make usability real to stakeholder
    - Shared usability vision
    - Who are stakeholder
- **Practitioner Issues** – practitioners have various issues that impact on their performance of usability activities. The categories coded here described issues that may lead to a more beneficial usability outcome or are detrimental to the usability outcome for a project.
    - Implementation/development Issue
    - Experience and familiarity with implementation issues
    - Mentoring to improve skillset

- Organisational-based usability practitioners vs. usability consultancy issues
- Usability practitioner know how
- Time for reflection and thinking (usually on resulting usability findings)
- Being the glue between various project stakeholder groups
- Technology orientated constraint
- Usability education to improve usability practitioner skills
- Usability ethics when providing usability advice
- Usability evangelising to improve usability understanding
- Usability manager roles and responsibilities
- Usability reporting (usually discussed by usability consultants)
- Usability scope as part of a project plan
- Selling usability in order to perform usability activities

- **Usability Activities** – the performance of various usability activities in a project. These categories describe specific activities performed within a project:
  - Need to be flexible when performing usability activity
  - Performing usability within a usability team
  - Building information architecture
  - Usability goals of a project
  - Usability measures used for quantitative analysis
  - Usability pattern usage in projects
  - Usability process activities within a project lifecycle
  - Usability and the project plan
  - Articulation of usability requirements
  - Usability research from an academic perspective
  - Usability techniques mentioned in discussions
  - Value placed on usability in projects

- Usability workaround required when constrained

- **Organisation Issues** – the organisation that needs a good usability outcome from their ICT projects encounter many obstacles that impact on this outcome. The categories include:
  - Acceptance of usability throughout a projects lifecycle
  - Organisational cost and risk in relation to usability
  - Incorporation of the organisation requirements (business goal)
  - Impact of internal and external political conflict in organisation
  - Commitment by organisation to usability
  - Organisational usability maturity
  - Usability misunderstood by organisation
  - Outsourcing usability activities and/or functions
  - Time given to usability by organisation

Appendix H – List of Abbreviations

UCD	User Centered Design
HCI	Human Computer Interaction
SIGCHI	Special Interest Group Computer Human Interaction
CHISIG	Computer Human Interaction Special Interest Group
IT	Information Technology
ICT	Information Communication Technology
IS	Information System
ROI	Return on Investment
UEA	Usability Evaluation Activity
CMM	Capability Maturity Model
UCM	Usability Capability Maturity
HF	Human Factors
IA	Information Architect
BA	Business Analyst
DOI	Diffusion Of Innovation
UPi	Usability, Productivity, and Integration.
RUP	Rational Unified Process
CUP	Classification of Usability Problems

Appendix I – Glossary

Research

Research is defined in the dictionary (Dictionary.com 2011e) as the *"diligent and systematic inquiry or investigation into a subject in order to discover or revise facts, theories, applications, etc."*. It's also described as *"Systematic investigation of a subject aimed at uncovering new information (discovering data) and/or interpreting relations among the subject's parts (theorizing)."*(Vogt 1993)

Information Technology (IT)

"The development, implementation, and maintenance of computer hardware and software systems to organize and communicate information electronically." (Dictionary.com 2011d)

Information Systems (IS)

"An integrated set of components for collecting, storing, processing, and communicating information. Business firms, other organizations, and individuals in contemporary society rely on information system to manage their operations, compete in the marketplace, supply services, and augment personal lives. For instance, modern corporations rely on computerized information systems to process financial accounts and manage human resources; municipal governmentsrely on information systems to provide basic services to its citizens; and individuals use information systems to study, shop, bank, and invest." (Dictionary.com 2011c)

Usability

Usability is the set of usability attributes that describes the interaction of, in human functional terms, the specified range of users, given specified training and support, to fulfil a specified range of tasks, within the specified range of environmental scenarios and organisational contexts for a specific usability situation.

(Definition discussed in Section2.2.1)

Usability problem

An issue that competes or conflicts with the set of attributes that define the usability for a given situation.

(Definition discussed in Section2.5.3)

Usability Activity

Usability activities are processes, that may or may not involve stakeholders, that generate usability outcomes and are performed throughout a development process; they must consider theset of usability attributes that define usability for the system and with appropriate usability measures perform the activity to generate usability outcome data.

(Definition discussed in Section2.2.2)

Usability Practitioner

A term that refers to a person who practices the performance of various usability activities in industry, throughout a project lifecycle, that improves the usability outcome of an information system. They may even be involved in innovation stages before project inception or activities after projects end.

Usability Maturity or Usability Capability Maturity Model

Often refers to a ranking of capability measures, often related to various processes within an organisation or project lifecycle, that are assessed and ranked according to a hierarchal CMM list (See Section2.5.4).

Shared Usability Vision

Often referring to a project, where usability requirements (that include a set of usability goals) define what usability is for a project. These usability requirements have been formed by eliciting business domain knowledge, stakeholders goals and project constraints from the various project stakeholders and concording these project elements. This elicitation is often done through performance of usability activities, where the usability mindset develops and enhances the shared usability vision (usability mindset for project)

Actability

“We define actability as an IS ability to perform actions and to permit, promote and facilitate users to perform their actions both through the system and based on messages from the system, in a work practice context” (Cronholm & Goldkuhl 2005)

Tactical Usability

Tactical usability refers to the actual performance of usability activities that generates usability findings. These usability findings are then used and have an impact on other project activities.

Strategic Usability

"As embedding usability engineering in the organizational processes, culture, and product roadmaps." and "usability data contributes to corporate-wide decision-making" (Rosenbaum, Rohn & Humburg 2000)

Sources

Refers to usability practitioners who were interviewed as part of this research that provided the primary data analysed.

Coded Reference

A contribution made by a usability practitioner during an interview that forms part of the primary data analysed in this research. This contribution relates to something of interest, which have been coded as part of a concept.

User Advocacy

When a stakeholder cannot be involved in usability activities, often a user advocate is used to represent them. This user advocate often is the usability practitioner.

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